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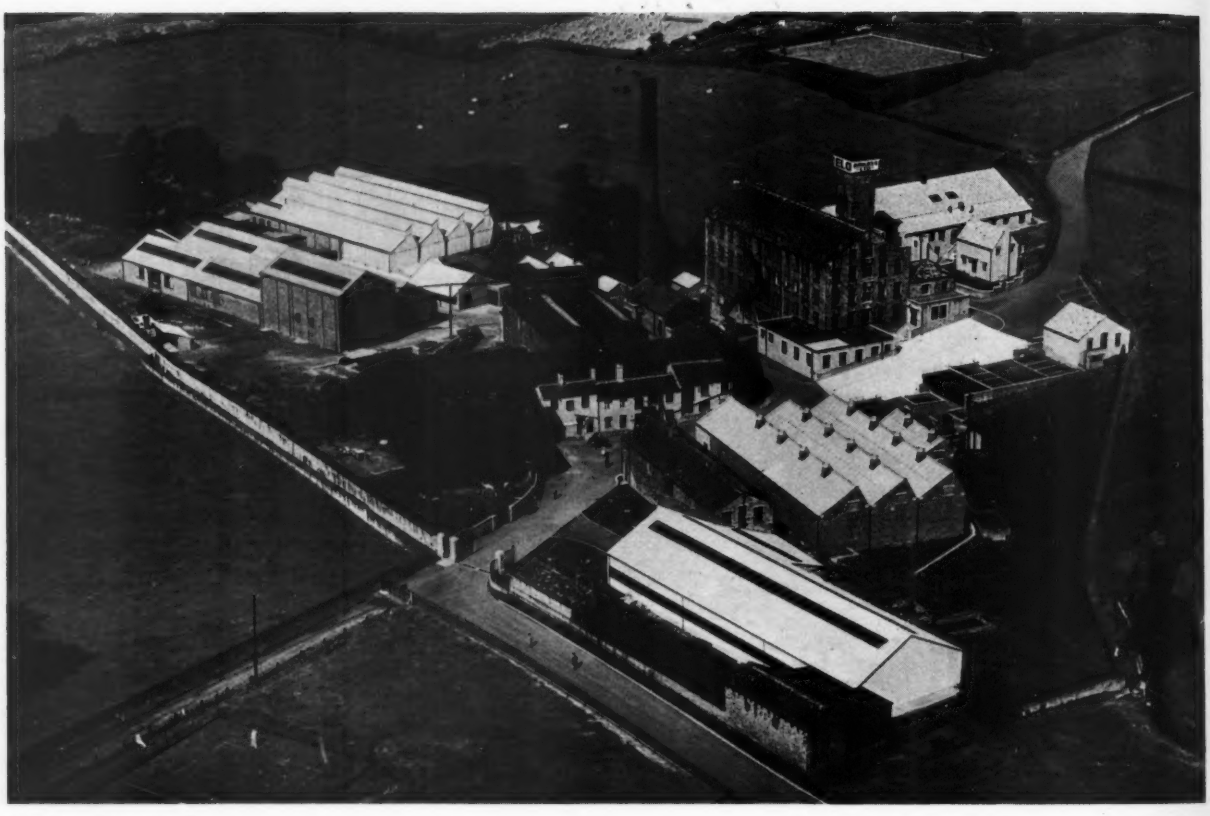

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PLASTICS PERFECT FASTENING

NOTE the double thread-cutting slot, which produces a sharp clean cut thread in any plastic material and assures easy driving.

cuts its own STANDARD MACHINE SCREW THREAD

CUTS OUT TAPPING

Tight and rigid fastenings in plastics can be made at much lower cost with the new Shakeproof Hi-Hook Thread-Cutting Screw. It taps and fastens in the same operation. A clean, sharp thread is obtained in any plastic material, because its double-slot design assures an acute cutting edge which drives easily, cleanly, and without fracture of the material. The fastening is tight, and should replacement ever be necessary, a standard machine screw of the same thread can be used. Reduce costs and speed up production by eliminating the cost of taps and the tapping operation. So that you can test this for yourself samples will be forwarded on request.

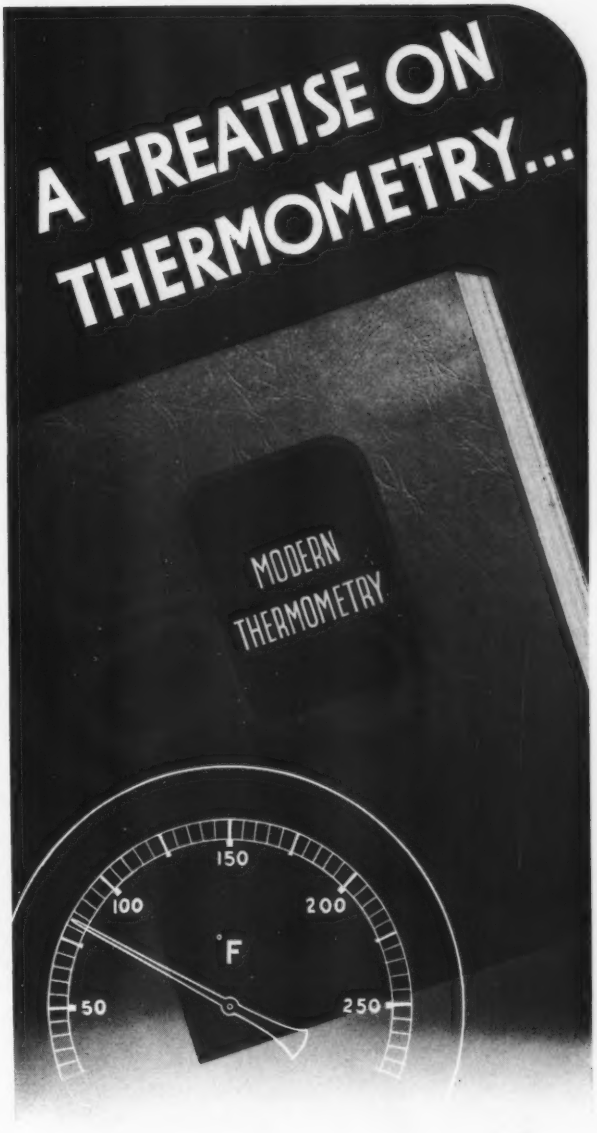
BRITISH PATENT Nos. 386,083 — 386,895 — 467,814 — 468,679 — 468,744—others pending.

SHAKEPROOF *Hi-Hook* **THREAD-CUTTING SCREWS**

MADE BY THE MANUFACTURERS OF THE SHAKEPROOF LOCK WASHER

BARBER & COLMAN LTD. · MARSLAND ROAD · BROOKLANDS MANCHESTER · TEL. SALE 2277 (2 LINES) · GRAMS. "BARCOL" SALE

A TREATISE ON THERMOMETRY...



THIS brochure gives dimensions, fixing data, prices, and other information about the entire range of Rototherm Gauges. It is a catalogue. But it is something more. It compiles information upon Thermometry problems in many branches of Commerce and Industry. The sort of book every Engineer, as well as every Buyer, will wish to have on hand for reference. Kindly mention this paper when requesting your copy.

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WORLD PATENTED

Pitchfords

COLOUR into RADIO

Colour into Radio won't go . . . so the Radio Trade have told us. But we are not convinced . . . nor is Dr. V. E. Yarsley. In a recent issue of "Times Trade and Engineering" he wrote :

"From the purely æsthetic point of view . . . the moulded plastic is but a poor imitation of wood, though in respect of durability, physical strength, and electrical properties the plastic is invariably superior. Clearly it should be the aim of the manufacturers of plastic radio cabinets to utilize to the full that outstanding property of plastics—namely colour . . .

Radio cabinets should be regarded as ornaments, and should be available in colourings to conform to the general scheme of room decoration. Plastics are the only constructional materials offering unlimited colour possibilities, and it is therefore both surprising and disappointing that manufacturers are in the main content, year after year to confine their attention to imitations of wood. The success of the coloured telephone should be taken as an example".

THANK YOU DR. YARSLEY . . . and may we invite you to our Stand at Woman's Fair Olympia (Stand 157, Ground Floor, Empire Hall) to see the new B.I.P. Super-het. It is made in Beetle, with a range of eight different colours — or you can have any other colour you choose from the whole Beetle range,

British Industrial Plastics

BRITISH INDUSTRIAL PLASTICS LTD., IDEAL HOUSE, ARGYLL STREET, LONDON, W.1.

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials.

Vol. II. NOVEMBER, 1938 No. 18

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TEMPLE PRESS LIMITED
Proprietors, Printers and Publishers of "The Motor," "The Light Car," "The Commercial Motor," "Motor Cycling," "Cycling," "The Motor Ship," "The Motor Boat," "The Oil Engine" "The Aeroplane," "Light Metals," and "Chain & Multiple Store."

5-17, Rosebery Avenue, London, E.C.1

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Another Problem Solved with BAKELITE MOULDING MATERIALS

The mouldings are produced from BAKELITE material X.4980/SR (Patd.), by Messrs. Thomas De La Rue & Co. Ltd., for Redler Conveyors Ltd.

Continuous lengths of the Redler conveyor chain are formed by the repetition of two standard mouldings which are cleverly designed so that they can easily be assembled into chain form, but cannot become detached in service. The chain is in contact with a chemical which has a severely corrosive action on metal, but does not affect the special BAKELITE material employed for the links.

The adoption of BAKELITE materials for the Redler conveyor chain provides yet another instance of their ability to withstand severe conditions of service. Ask the advice of our Technical Department; the products of Bakelite Limited will be recommended for use only where they can be employed successfully.

BAKELITE LIMITED, 68 VICTORIA STREET, LONDON, S.W.1

Telephone: Victoria 5511 (5 lines) Works: Birmingham (Est. 1910)

BAKELITE

Registered TREFOIL Trade Marks

THE MATERIAL OF INFINITE USES

Vol. II. No. 18 NOVEMBER, 1938

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials

Proprietors - - TEMPLE PRESS LIMITED
Managing Director - ROLAND E. DANGERFIELD

Editor - - M. D. CURWEN, B.Sc., A.I.C.
Offices - 5-17, Rosebery Avenue, London, E.C.1

SAVING MONEY IN INDUSTRY

TO the average man in the street the impact of plastics on life often simply means the introduction of a new raw material. On the whole, he sees it merely taking the place of the old—obviously more colourful, cleaner, often stronger, and, of course, non-rusting. There, we agree readily enough, are sufficient reasons to justify the introduction of plastics to the world's markets. But so much more lies behind, in the manufacture, that it is worth while considering plastics as an aid to the engineering designer and to the industrialist. Above all, it is worth while commenting on the effect of plastics on the economics of industry.

The introduction of synthetic-resin moulding powders which under heat and pressure can be made to flow round corners and into every tiny crevice of a steel mould, created an entirely new orientation in engineering, the full possibilities of which were grasped but faintly when the plastics moulding industry began. To-day there exists the plastics designer partaking in a new era of engineering design.

To take the simple example of the old type of shaving-stick container, which was fabricated from two pieces (omitting the lid); one, an oblong sheet, was made into the cylindrical portion, and the other, a circular piece of the same metal, formed the base. Both were generally cut on different machines. The modern shaving stick of plastics is, of course, made in one piece and at one blow, so to speak, of the press. Actually, six to a dozen are made at one blow. But to revert to the metal container. Before the pieces of sheet become the finished object two crimpings must take place, one in making the cylinder from the flat sheet and another in joining the cylinder to the base. In other objects soldering may take the place of crimping. But the tale is not yet ended. Since tinned sheet in its naked form rarely satisfies our æsthetic tastes, and is far from being rustproof, it must be painted or lacquered by an additional process employing special printing and dipping machinery. Often, too, the inside was lacquered to prevent rusting.

This simple example can be multiplied and complicated very readily. Last week we were shown a special type of lamp holder made of phenol-formaldehyde moulding powder for the Air Ministry. It was in one piece and replaced an original design made in six separate pieces, mostly of metal. Think of what this means in saving of manufacturing plant, in handling and fitting together, in absence of soldering, of unnecessary screws and nuts and bolts, in absence of buffing and polishing and lacquering.

When the metal object is metal plated, yet another series of processes is involved. Using plastics, the moulding is generally complete on leaving the mould. It is rare that even a buffing is required.

The moulding of plastics has created a new simplicity which is having a profound effect on the very economics of industry. It is this type of simplicity, perhaps more than the simplicity that brings forth a new art form, that will appeal to the industrialist.

Colour and Radio

BRITISH Industrial Plastics, Ltd., has rendered the whole of our industry a signal service. By exhibiting at the Women's Fair, Olympia, radio cabinets moulded of beautifully coloured plastics this concern hopes to give the lie to the oft-proclaimed dictum that the British home does not want colour. What nonsense that statement is! We are sure that in the past the trouble has been that the agent and the radio manufacturer with little imagination have thrust the drab-looking wooden cabinet down the throat of the public, who have been forced to believe that the radio cabinet must be of mahogany or walnut and must look like a sideboard or a cocktail bar.

It is strange that the average radio agent, whose taste in art, judging from the horrors of their windows, is nil, should set up as translators of the public taste. They have pronounced that the British public do not want colour. The public *do* want colour and need it, but they must be shown how to use it. Unfortunately the average agent has not the ability to carry out this teaching, and will be only interested when he realizes that colour is a saleable commodity. The teaching, then, must be carried out by those who do understand the

matter. Such a force now exists, for British Industrial Plastics, Ltd., has enlisted the aid of two other powerful units, Pye, Ltd., who have supplied the modern Superhet, and Alfred Imhof, Ltd., whose musical instrument showrooms in New Oxford Street are among the brightest in the country. This combination deserves success. The colours of the cabinets in Beetle presages it. Those we have seen are in Seafoam, White Onyx, Parma, Sunray, Starlight, Ash, Jade and Ivory, and are not only beautiful but exciting.

British Industrial Plastics, Ltd., have been courageous in the past. Their latest movement deserves our gratitude.

Plastics in the Hardware Store

ONE of the largest tool manufacturers in America is now equipping all his saws and other tools with handles made of cellulose acetate for purely practical reasons. In the first place, cellulose acetate is a good deal tougher than wood and has a very high impact strength, so that there is far less likelihood of the plastic handle breaking under a sudden strain than a similar one made of boxwood. Another reason is that the moulded handle does not stain the hands and does not so readily cause callouses or blisters.

There is, of course, the greatly appreciated value of plastic handles from an appearance standpoint, and every salesman knows that bright, cheerful colours help more than any other factor to focus attention on new lines and stimulate interest and eventually effect a sale.

Apart from carpenters' tools, there are many other items in the hardware store which could well be modernized and improved by the use of plastics. Many garden tools could be equipped with moulded handles.

Plastics and Design

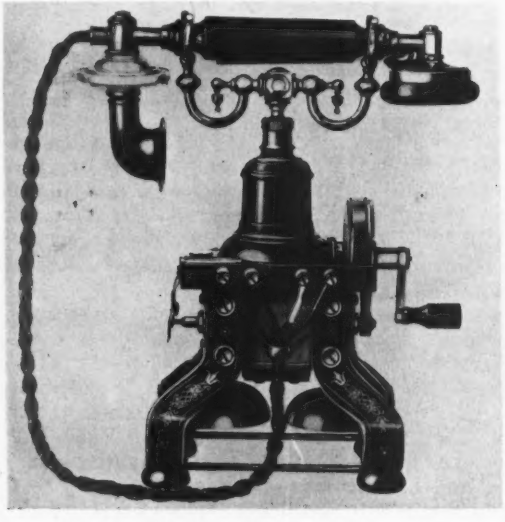
IT is pleasing to note that the opening meeting of the Society of Industrial Artists' Plastics Section, to be held at the Central School of Arts and Crafts, Southampton Row, London, on Tuesday, November 29, at 7 p.m., will consist of a display of two documentary films dealing with the subject of "Plastics—Design and Production Explained." At this stage of the life of the plastics industry it is important that there should exist a strong liaison between it and art. This the Society of Industrial Artists' Plastic Section fulfils admirably. Indeed, it is the Society's object to give designers and students of design a general conception of the technicalities of plastic production. These films will help to stimulate designers' interest in plastics in a more forcible manner than by mere talk and should thus prove useful to both the industry and designers in making the two parties better acquainted with each other.

The films will be followed by a commentary and discussion, and it is hoped that executives from all sections of the industry will take part. The films will be shown by permission of Bakelite, Ltd., and British Industrial Plastics, Ltd.

JUST TO REMIND YOU

Here is the second of this series in which we compare a modern manufacture in plastics with its forerunner. In this instance where we show a magneto telephone of 1910 and a modern post office telephone in ivory Beetle, there is much to praise both the Post Office and the plastics industry.

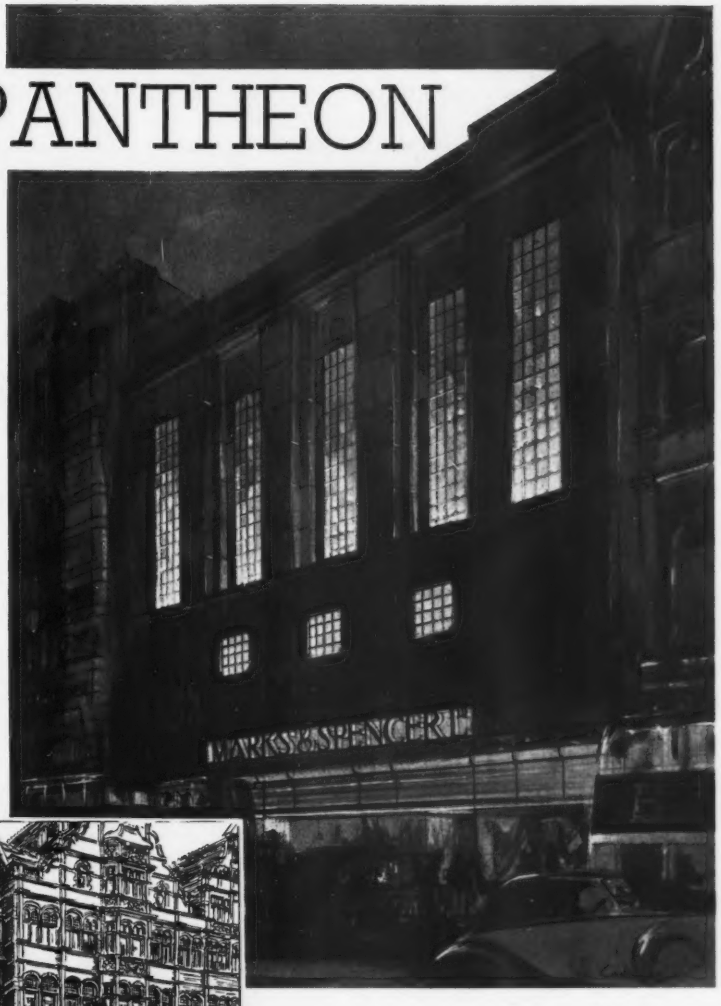
Let us look first at the pre-war specimen. How full of the style of the Victorian and Edwardian eras it is. A pinched-in waist with a crinoline and very stout limbs (we must not say legs) decorated with a gilt motif, and all surmounted by what, to modern eyes, looks like a ramshackle Victorian chandelier. Much was of metal, and wires, screws, wheels, cogs and other parts were exposed, allowing for easy breakage and the collection of dirt. The modern telephone of plastics means cleanliness, safety and efficiency.



1910 ——— and ——— 1938

The NEW PANTHEON

ONE hundred and three years ago the Pantheon, Oxford Street, was a successful bazaar where our great grandmothers walked with mamma in search of bargains, perhaps a few yards of flowered silks from the East or hand-worked lace from the Netherlands. Erected on the same site to-day is the new Pantheon of Marks and Spencer, where, engaged in the same quest as their sedate predecessors, many thousands of our wives, sisters and mothers are also looking for bargains which range over a far wider and more fascinating field than those of 103 years ago.



(Top, right) A sketch of the new Pantheon building. On the left is a reproduction from an original drawing of the old building by Hanslip Fletcher in the possession of Marks and Spencer, first published in *The Sunday Times*, 10th May, 1936.

FROM masques and balls to exhibitions of scientific apparatus; from grand opera to assembly rooms and concert chamber; from bazaar to wine merchants; thus reads the history of the old Pantheon which, however, to-day exists only as a name. The 1938 Pantheon which rears its imposing façade on the original site is now the new West End home of Marks and Spencer, Ltd., that progressive and flourishing company with branches in every important town in the country.

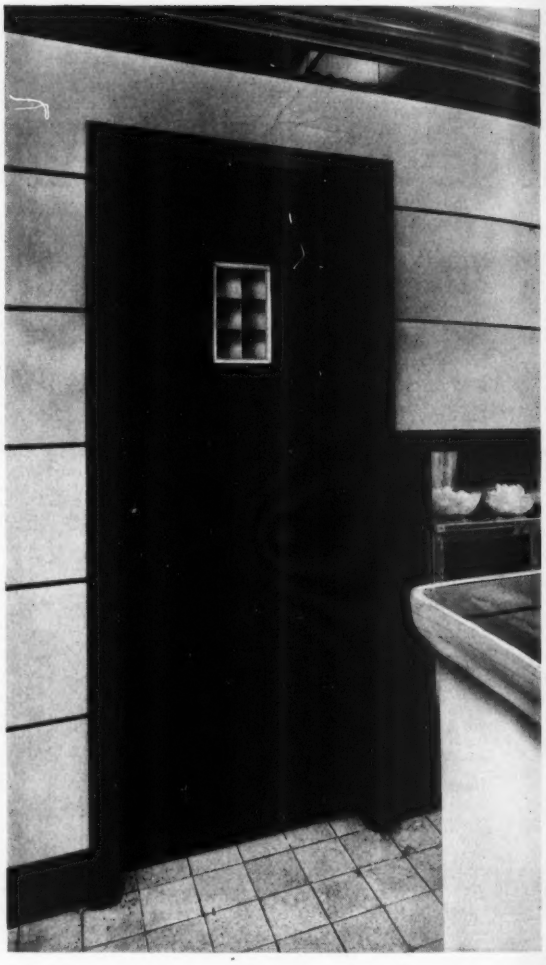
During the past 165 years the Pantheon has passed through some eventful and romantic years. The original building was completed by James Wyatt in 1772 and acclaimed throughout Europe as a veritable jewel of architecture. Horace Walpole declared it to be "the wonder of the eighteenth century and the British Empire." Incidentally, it was dedicated to "the nocturnal adventures of the British aristocracy."

It has been said by more than one chronicler that the Pantheon reflected with unerring accuracy the vagaries of thought, fashion and manners of an artificial age. The original building was an unqualified success, both architecturally and as a place of amusement, but the second Pantheon, erected by Wyatt after the complete destruction of the original by fire in 1792, never really attained any great popularity as a theatre or ballroom, although it was well patronized when it was converted into a bazaar. In 1867 it was taken over by the famous firm of W. and A. Gilbey, the wine merchants, who used it as their headquarters for 70 years. Finally, in 1937, the last act was played when

the building was demolished and a new multiple store, still called the Pantheon, erected on the site.

The Pantheon of 1938, designed by Mr. Robert Lutyens in association with W. A. Lewis and Partners, is typically modern in so far as design and new materials are concerned, and it makes many contacts with the present-day tendencies of thought and habit. The simplicity of decoration and austerity of design represent the best tendencies in contemporary architecture. Plastics have contributed a useful quota to the pleasing appearance of the 20,000 sq. ft. interior, as the café tables are made of black Bakelite laminated board and the service door is also of the same material. To complement this the gaily dressed waitresses all use moulded brown mottled Bakelite trays, which the management have chosen because they are noiseless and clean looking. These few applications of plastic materials, although perhaps not in themselves very important, are significant because they represent the new and vital interest now being taken in the products of our industry by the large multiple stores. Frankly, the management of Marks and Spencer, Ltd., like plastic materials for several reasons; first of all, they are cheap and yet do not deteriorate in the same way as metal; secondly, they are available in the large quantities the company need at short notice; thirdly, they are available in permanently coloured forms as well as black and white, which can be relied upon to meet all the demands of a critical public.

The plastics industry must, however, wake up to the fact that whilst a profitable market exists for their goods in chain stores, the only really sure way to secure it is by what the Americans call "imaginative salesmanship." Moulders will do little business in this field if they rest content to wait for the multiple stores to come to them. They must of necessity create work by evolving original ideas in plastics, particularly for display purposes. To mention only one line, there is at the moment good business to be done in the moulding of holders for price tickets and show cards for counters and windows, and larger units in bright colours for showing off ties, socks, shirts and other items. Yes! there is money for plastics in the chain stores!



The Bakelite laminated door leading to the kitchens.

The cafe at the Pantheon, showing the Bakelite-topped tables.

MORE PHYSICAL JERKS WITH PLASTICS

In our last issue we dealt with the relation of plastics to physical fitness with special reference to the opportunities for the use of plastics in the gymnasium. It has since come to our notice that plastics offer a solution to one of the major problems occupying the attention of those concerned with the provision of gymnastic equipment. This problem is the storage of physical training clothing.

These ingeniously designed containers for clothes to be worn in the gymnasium should prove very welcome to a large number of organizations, schools, hotels, etc.

On first thought this does not appear to offer any difficulties, but reflection reveals that although the clothes, i.e., vest and shorts, are small in bulk, the number of individuals making use of a properly equipped gymnasium, and often several times per week, is considerable. Although a separate small wardrobe for each person is the ideal, the cost both in providing the wardrobes and in the building required to house them would be prohibitive. It is therefore desirable that each unit should be compact. Next, the clothing although light in texture is worn against the skin and in circumstances inducing considerable perspiration. The storage must therefore provide positive aeration and means whereby the dampness due to perspiration may be driven off. Under these conditions it is essential, if the compartment or container is to remain clean and sweet, that the material used for its construction should be non-absorbent, non-corrosive and non-rusting. It is also desirable that contact between the clothes of any two individuals should be avoided. Bakelite not only fulfils all these conditions but offers in addition strength, lightness, colour and economy. It is for this reason that we are glad to be able to bring to the notice of our readers the "Henderson" Hygienic Container, marketed by Messrs. G. and F. Henderson, of Enstone, Oxford, and moulded for them by H. E. Ashdown, Ltd.

It will be noted that the clothes are loosely rolled and placed in the container, which forms one of any combination required for class purposes. The space between each container provides a positive channel for the circulation of hot air, and while each interlocks with the others through the medium of an ebonite pin, easy withdrawal is possible if necessary. Identification of an individual container is provided by a coloured numeral fitted into a recess in the corner of each container.

There seems little doubt that this hygienic moulded clothes container will find many further uses, particularly in sports pavilions, schools, and even hospitals.

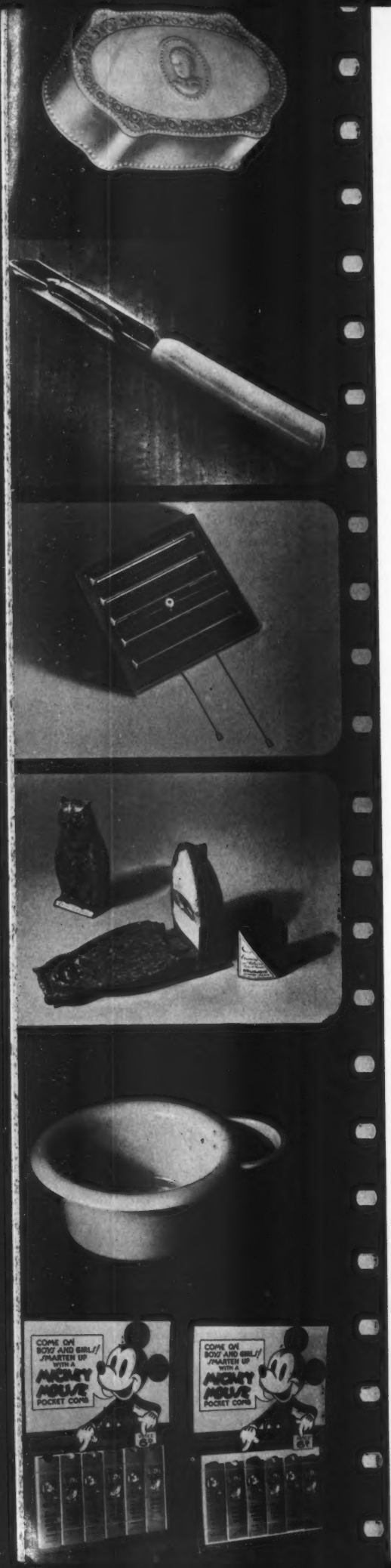
AMERICAN PROGRESS WITH PRINTED PLASTICS

Until quite recently considerable difficulty has been experienced in the printing of plastic surfaces, but during the past 12 months great progress has been made. By one process it is possible to print on plastics in four colours with one operation. Half-tones and line cuts may be accurately reproduced. The articles to be printed are automatically fed from a hopper and when the printing process is completed automatic conveyors carry the parts through an electrically controlled oven, where, for 30 minutes, they are subjected to carefully regulated temperature, which results in the printing becoming homogeneous with the piece. Such printing will resist the action of moderate solvents, and also the wear and tear which often defaces paper labels. An important feature of this treatment of plastics is that the oven heat is so controlled that no shrinking, distortion or discoloration of the plastic material takes place.

Printing on extruded tubes, although not exactly a printer's picnic, is now being done on a large scale, and the printing is carried out in one, two or three colours with a register as perfect as though the surface were flat and perfectly stable. More than that! Printing is done on tapered, ribbed, fluted, octagonal, hexagonal and other diversified external shapes without distorting the printed pattern in the least. The trick is apparently to print while the tubing is in its original shape, then by a mechanical operation change the shape to any desired form without distorting or damaging the printed surface.

"General Release"—I

New and Interesting Plastic Goods


COME ON BOYS AND GIRLS! SMARTEN UP WITH A MICKEY MOUSE POCKET COMB
COME ON BOYS AND GIRLS! SMARTEN UP WITH A MICKEY MOUSE POCKET COMB

ALTHOUGH a trifle Victorian in design, this trinket box by The Gorham Co. of Rhode Island is proving very popular in certain parts of America, particularly the agricultural areas of the Middle West.

A NEW design and the use of new material for the handle has given distinction to this efficient little apple peeler. The handle is made of brightly coloured Catalin.

THE "Regulatair" is one of the simplest and most economical ventilating devices on the market and owes a great deal of its appeal to the fact that it is completely moulded of Bakelite. A gentle movement of the cord attached to the back of the ventilator gives a full flow of air, and a slight adjustment moderates the air; a further slight movement closes the ventilator. Messrs. Shaw and Shaw, Tenby Street North, Birmingham, are the manufacturers.

THE latest novelty pack just released by Bourjois for their Evening in Paris perfume is moulded of amino moulding powder made by Mouldrite, Ltd., and moulded by Prestware, Ltd., Merton, S.W.19.

THE Bex moulded chamber for the nursery should prove quite a boon. It is light in weight and far less liable to damage than the usual one made of porcelain or enamelled metal. The British Xylonite Co., Ltd., are the manufacturers, and they inform us that the range is available in a variety of colours.

THESE Mickey Mouse pocket combs, manufactured by the British Xylonite Co., Ltd., Hale End, London, make a wide appeal to the juveniles. The window and counter displays illustrated certainly do catch the eye, and we imagine that many chemists will welcome them as money-making contributions to the counter and shop window.

"General Release"—II

New and Interesting Plastic Goods

MANUFACTURERS of toilet preparations are now paying considerable attention to the appearance of both old and new lines. D. and W. Gibbs, Ltd., London, are particularly proud of their new moulded dentifrice container. It was developed by Universal Metal Products, Ltd., who specialize in this type of work. The material used was white paper filled amino powder for the lid and black wood filled amino powder for the base.

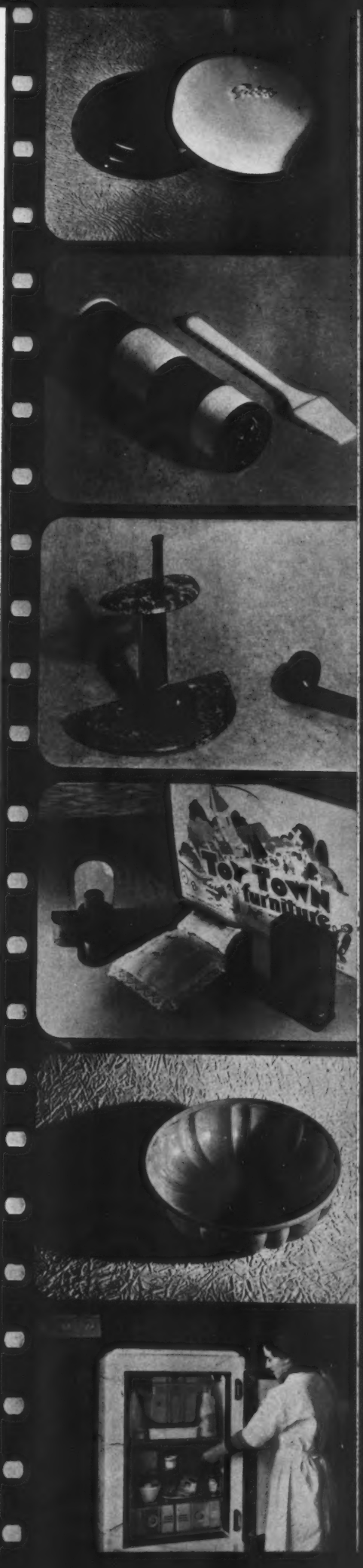
FOR compactness and ingenuity this built-up beauty container, moulded by Colts Patent Fire Arms Manufacturing Co. of America, deserves praise, especially by the ladies. The moulded container can be unscrewed and the components used for holding various kinds of make-up. The neat little moulded spade for conveying cream or powder from a jar to the little screw-up containers is an accessory that should prove particularly useful.

THE pipe smoker will no doubt welcome this compact and not unattractive pipe holder, which is now on sale at most of the large multiple stores. The device consists of three parts, the top and base being moulded of phenol-formaldehyde resin, the connecting rod being of metal.

THE latest Toy Town moulded furniture by British Xylonite Co., Ltd., Hale End, E.4, now caters for married doll couples and should prove very popular this Christmas. The double bed shown in the photograph is a particularly ingenious moulding job and certainly looks very attractive.

THIS new bowl is being made by the Streetly Manufacturing Co., Ltd., for Woolworth's, and should prove quite a good line, as it has been shown as the result of past experience that well-designed and attractive articles like this bowl always find a number of uses. It is supplied in the usual colours in Beetle, namely, white and translucent blue, orange, green and yellow.

THE new Westinghouse refrigerator contains a good deal of plastic material. Black Micarta strips are used for lining the door, and the Westinghouse Electric Co. have found that no other material is so suitable for this exacting purpose. Micarta keeps its shape indefinitely and is unaffected by the low temperatures of the refrigerating system.



The Case for Wrapped Bread

FOR some years now medical officers of health in various parts of the country have been agitating for legislation to deal with the compulsory wrapping of bread in the same way as the 1924 Meat Regulations compel butchers and others to wrap all meat before selling it. So far, however, little progress appears to have been made in persuading the Home Office to take what most public health authorities regard as an obvious step in safeguarding the purity of our staple food.

There is no lack of evidence proving that unwrapped bread is often open to serious contamination by dirty hands, clothing, baskets, vehicles and, of course, the dust of the shop, road and house. The dust factor is most important in view of the fact that loaves of bread are frequently left on doorsteps, window sills and outhouses, if there happens to be no one at home to take them in when the baker calls. Even those with only a rudimentary knowledge of bacteriology must realize that disease-bearing bacteria are to be found in great abundance in the dust of cities, and unprotected bread can quite easily become a source of infection. Several medical writers have pointed out that in the case of unsuspected disease carriers employed by bakeries, it is by no means improbable that the bread they handle might become infected. The Medical Officer of Health for Hackney pointed out some years ago that there are much typhoid and paratyphoid fever and other highly contagious diseases which cannot be traced to any known source and might easily be caused by infected bread.

On the grounds of public health there is undoubtedly a very strong case indeed to be made out for the compulsory wrapping of bread, and the evidence in favour of it grows every week. It has, however, been said by some food experts that wrapped bread is frequently dry and unpalatable. That this is false is clearly proved by the fact that some of the largest bakeries in the country are now wrapping bread, and in America the practice is fast becoming the general rule and not the exception. Those bakeries already wrapping bread are convinced that proper protection eliminates moisture loss from the bread and helps to keep the loaf in a palatable condition for a longer time. Then, again, the actual baking process can be successfully and quickly adapted so as to produce a loaf perfectly suitable for wrapping.

At present most of the paper used for wrapping the bread is of the waxed variety, and, whilst it is quite serviceable, it is by no means ideal. In the first place, waxed paper proves difficult to stick down and, in consequence, the loaves quite frequently become partially unwrapped, lose their moisture and grow stale very quickly.

Another disadvantage shared by waxed paper is that some of the wax gets rubbed on to the crust of the loaf and may possibly affect the flavour of the bread. Against these disadvantages is the fact that waxed paper is cheap and comparatively easy to handle in high-speed mechanical wrapping machines, capable of operating at speeds of up to 1,500-2,000 loaves per hour.

The success which has been attained by the use of "Cellophane" for wrapping confectionery has focused

attention on the possibilities of using this material for wrapping bread, and it appears to offer great promise.

For speciality breads, where the attractive appearance of the loaf is a factor in stimulating its sale, "Cellophane" cellulose film is being adopted, and in the United States transparent cellulose film is now being used very extensively for this purpose. It is also of particular value in the wrapping of sliced bread, as it enables the purchaser to see the thickness of slices without difficulty.

For bread wrapping, the heat-sealing, moisture-proof type of "Cellophane" film is almost invariably used. This will seal at a temperature of 130 degrees centigrade and only a short time of application of heat is necessary. The seal is, moreover, a good one and there is little chance of the wrapping becoming undone. The transparent, tough film, being extremely moisture resisting, keeps the bread in a fresh condition for quite a considerable time, but necessitates that it should be properly cool before wrapping in order to avoid the possibility of mould formation. The use of "Cellophane" offers no difficulties in the way of efficient mechanical packing of the bread. All that is necessary is to arrange for the correct heater temperature by means of the switches provided, and thoroughly to clean down the machine with solvent in order to remove every trace of foreign matter.

An excellent and, indeed, very convincing case can be made out for "Cellophane" wrapped bread. This transparent, strong and moisture-resistant film not only fully protects the bread, but also greatly enhances its appearance. Although it might be argued that as bread is a staple food and in such constant demand its appearance does not matter very much, this conclusion is, however, quite false, because every baker must realize that the more appetizing and fresh his goods look the better is their chance of a quick sale. It is not too optimistic to prophesy that "Cellophane" will shortly be adopted by the large bakeries in this country, perhaps not on the same scale as in the United States, but at least for speciality breads with a price margin which would permit the extra cost.

PETON— The New Plastic for Engineers and General Construction

ABOUT a year ago we gave publicity to the fact that a new plastic material of remarkable properties of special interest to the engineer would soon be available to the British market. These properties included extremely high tensile strength, about two to four times as great as the tensile strength of ordinary moulded or laminated materials. It is a product of felt-like structure obtained by impregnating fibrous fillers with resin in the form of emulsion, just when felt formation has begun. It is available in two forms, one as a flock-like material and the other as sheet, both forms being readily mouldable. The material is known in this country as Peton and is marketed by United Insulator Co., Ltd., 12, Laystall Street, London, E.C.1.

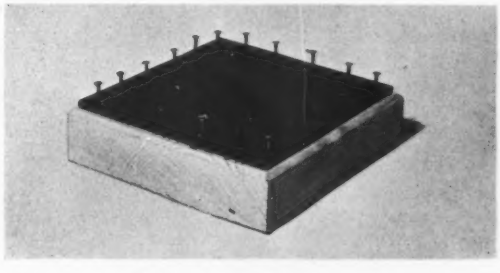
The following gives some of the more important characteristics of the new material:—

Tensile strength	23,000 lb. to sq. in.
Compressive strength ...	25,000 ,, ,, ,,
Shearing strength ...	18,000 ,, ,, ,,
Impact strength	25 cm.kg./cm.^{2}
Heat resistance (Martens)	186°
Water absorption (after immersion for 24 hrs.)	.8%
Young's Modulus	2,000,000-3,000,000
Dielectric constant ...	4 at 1,000 kc.
Power factor	Tan. −3.45% at 1,000 kc.
Surface resistance (in dry condition)	100,000 Megohms approx.
Surface resistance (after 24 hrs.' immersion) ...	60,000-80,000 Megs. approx.
Surface breakdown in air after immersion in water 1 mm. thick	15,000 V.

Apart from the great mechanical strength and excellent electrical properties it possesses, the low water absorption is especially noteworthy. Moreover, the material will not delaminate under any conditions; it will not split, warp or blister, or deteriorate in cold or hot oils within the limits of B.S.S. 547. It is also impervious to most chemicals, and petrol and spirits, hot or cold. It can be machined in all the known ways very readily; in addition, it can be riveted without fear of splitting, and, furthermore, it is even possible, also without fear of splitting, to nail very thin sheets.

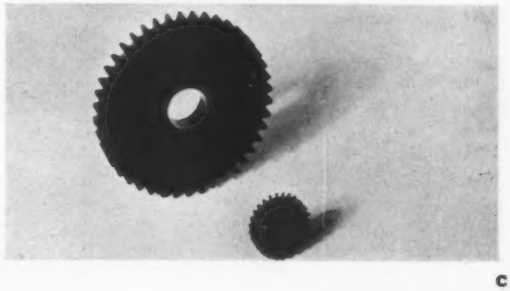
With such a remarkable combination of characteristics we look forward to the wide adoption of this material in a variety of industries. Gearwheels have already been produced and the use for making bearings is obviously indicated. It is also being employed for constructional work, details of which have not yet been divulged. These we shall report on as opportunity occurs.

The figures given have been obtained from the testing of standard test pieces, and it should always be realized that if these tests are made of a special nature the figures obtained may vary slightly one way or the other.



(Top) Peton sheet nailed to wood base.

(Bottom) Gearwheels of Peton.



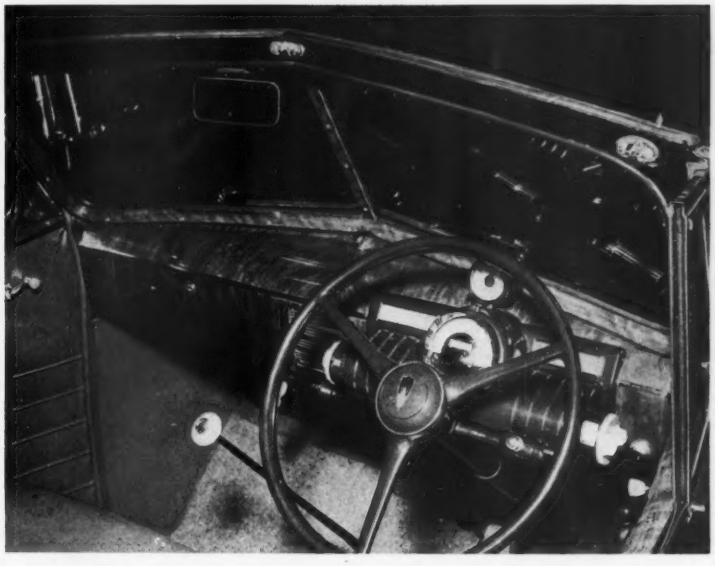
The high-spot in plastics at the Motor Show. A Bentley with complete facia-panel and door cappings of transparent golden Catalin.

PLASTICS AT THE MOTOR SHOW

The home of many of our hopes in plastics.

THIS bright new motor world we seem to be hankering after with the aid of plastics will, no doubt, be very slow in evolving. Neither Nature nor artifice proceeds by jumps, so that we must be content with seemingly slow progress, and, just as the editor of *The Tailor and Cutter* must wait for men to agree to polychromatism in their clothes or cut that varies between individuals, so it will mean the overcoming of a considerable inertia before the motorcar manufacturer in general is able to convert his products into colourful objects.

The problem is present in other spheres of manufacture and is one that has puzzled and worried far too many. Should an electric fire, for example, be produced in half a dozen different colours or only in one or two? The electric fire with the plastic surround has proved itself very popular, but in how many colours is it really acceptable? In actual fact, this very problem has been examined and very few colours are possible—from the sales point of view. A housewife, at least the average one, will not buy a beautiful red one because of the fear that it will clash, because of its brightness, because of its colour, or because the background may be changed in a year or two. Whatever our opinion is, it is a fact that white and black, and possibly brown, are the only generally acceptable colours. Certainly the housewife, and even her hus-



A brilliantly designed plastic instrument carrier on the Oldsmobile.

band, are not courageous in this country where colour is concerned.

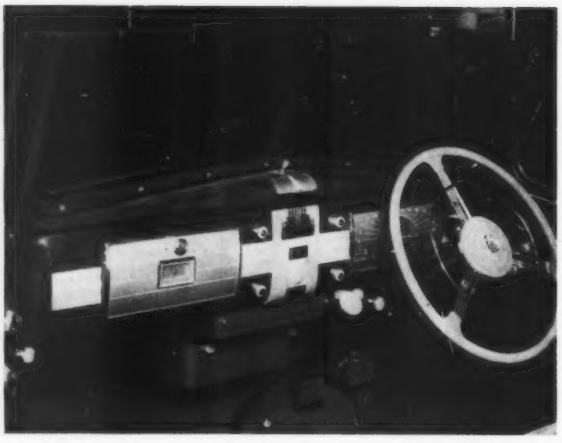
Surely the motorcar, or, rather, its interior, is a different pair of shoes and should not be considered in the same way as a portable object in an enclosed room? It is a habitable structure itself and its decoration should be considered from that point of view, or, if any background of comparison is wanted, there is the biggest of all in Nature. If this were done we are sure that the cheerful and even gay interior as well as exterior would be general in cars used both for pleasure and business.

In this country black and sombre-coloured cars are, for some strange reason, considered a sign of respectability, just as, for an even stranger reason, a man in a black silk hat or that horror of modern London life, the "Eden" hat, is, ipso facto, a pillar of righteousness and probity. Thus the high-priced motorcar used for business must be sombre in hue. On the other hand, youth and their sports cars are wisely gay, and so, with accompanying richness, are the cars of the affluent American business man, who has few prejudices regarding surface respectability and little fear of introducing colour to emulate or contrast with the blue sky.

Last year, when reporting on the Earls Court Exhibition, we moaned aloud at the lack of appreciation of plastics by the British motorcar manufacturers, and at the dullness of the interior of their products. On the other hand, the American Nash with its beautiful beige strip of plastics on the instrument board showed how really cheerful an interior could be. Only two months ago at a visit to the Sunbeam-Talbot works we saw a glimmer of light in an otherwise darkened automotive world. The first facia board which was also a unit of construction in the car and not merely a surface to a structure, had come on the market. Moreover, an attempt had been made to introduce a somewhat brighter colour than that hitherto employed. At any rate, it heralded the promise of gayer things to come.

To-day, we should not grumble too violently, and, indeed, at Earls Court last month there was much to be thankful for, to arouse one's pleasure and even to rejoice. This year's Motor Show is for us the most important that has yet been staged, for not only were more plastics than ever before introduced, but we have seen the high-spot in interior car decoration, and that car a British one!

The instrument board of brown-coloured plastics on the German D.K.W.



The Nash, with its beige-coloured instrument carrier in plastics.

Perhaps the aforementioned Nash has something up its 1939 sleeve, but it will have to go very far to produce something more beautiful than the interior of the Bentley we saw at the stand of Park, Ward and Co., Ltd. Other car manufacturers will forgive us if we gloat over the fact that the car chosen for this decoration was a Bentley, for it immediately places plastics in a category it has long deserved. We need only mention now that the plastic employed here is Catalin, the well-known cast phenol resin.

The two photographs we publish of this car, being in black and white, show but inadequately the wonderful richness of this material. In sheet form about ¼ in. thick, it is of a lovely transparent golden red, shot with colour a deeper hue. Indeed, it has the appearance of a sublimated tortoiseshell, though far more delicately coloured than the natural material. The whole of the instrument board is constructed of it as well as the door-strips. Incidentally, this is the first time, we believe, Catalin has entered the motor industry in this country. As far as we know, even in America the only Catalin used on a car was on the Terraplane as a mascot. This is, indeed, a great step forward.

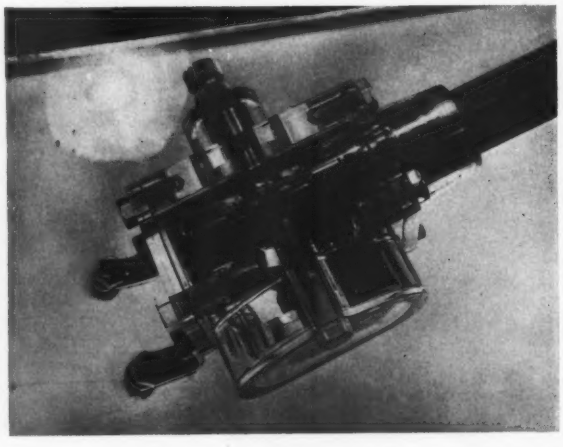
Of other British cars we note that the Hillman Ten continues to fit the plastic window frames made by H. E. Ashdown (Birmingham), Ltd., who have specialized in this work. There was also the Hillman Minx "ghosted" with Perspex to show its inner works, and the Sunbeam-Talbot with its complete moulded facia-board we described in our September issue.

Of foreign cars of special interest was the Nash, with the instrument board of beige-coloured plastic, we mentioned last November. The 1939 model has not yet arrived in this country. Oldsmobile has introduced a new instrument unit in their latest models which is especially noteworthy for its ingenuity of design and resultant compactness. Instead of stretching the entire width of the car, it nestles comfortably within the compass of the steering wheel. It carries all necessary instruments, speedometer, petrol and oil indicators, etc., and on the side the radio dial and regulator. All instruments are thus visible without turning the eyes. This moulding was produced by Reynolds Molded Plastics of U.S.A.

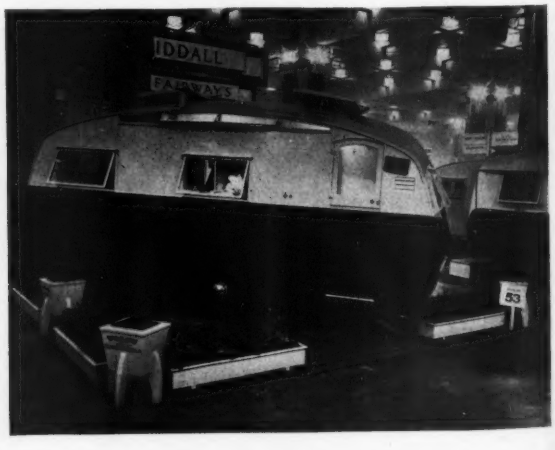
The idea of an instrument board running the complete width of the car and carrying two recesses on each side is adopted by the 8 h.p. German motorcar D.K.W. (Auto Union). This was moulded of a brown-coloured material which, we fear, did not enliven the interior greatly. Nevertheless, it was a very workmanlike job.

The only other point of plastic interest we noted was the exhibit on the stand of Cam Gears, Ltd., where a steering gear was cased in Perspex so that the working mechanism was seen in operation. The remarkable transparent resin was also used in sheet form for the sliding roof of a Rolls-Royce Phantom at the stand of James Young, Ltd. Vision and light can be secured with complete absence of draught.

Last year we grumbled at the scarcity of plastics in the ancillary caravan building industry. There seemed to be more trailers than ever on view this year, reflecting their wide popularity, but there was not even a sign of plastics. Surely here we have a construction which, in view of its use outdoors under what must be harsh conditions, needs special materials. Far more open to the elements than is a house, and open to far rougher treatment in view of the comparative small compass, there seems plenty of opening for plastics. Especially is this true of the laminated type, not only for table tops and shelves, but also for wall panels. The alcohol and blister-proof table top should be specially attractive in an environment where beer and cigarettes are not handled with excessive care.



Cam Gears, Ltd., showed the working of a steering gear through the perfect clarity of Perspex.



A sad sight. Very lovely, inside and out, but not a piece in plastics in any caravan.

A Schering bridge to measure the power loss and permittivity at audio-frequencies.

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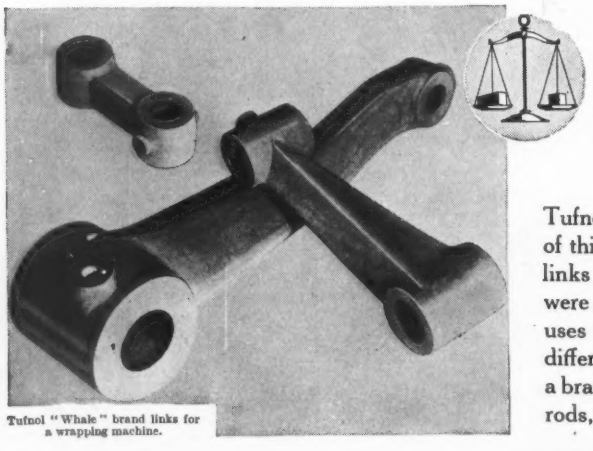

Tufnol "Whale" brand links for a wrapping machine.

Tufnol is only half the weight of aluminium. Advantage was taken of this fact when metal links on a wrapping machine were replaced by links made of Tufnol. The immediate result was that operations were increased from 750 to 1,000 per minute! Tufnol has innumerable uses and is employed in practically every industry, in hundreds of different ways. Whatever your own particular requirement, you will find a brand of Tufnol to suit it. Tufnol is supplied in the form of sheets, tubes, rods, angles and channels, for manufacturers to produce their own parts.

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PLASTICS IN PHOTOGRAPHY

THE progress of photography is to-day dependent on the progress of the plastics industry. This fact was stressed by Mr. D. McMaster, F.P.S., in his lecture on "Plastics in Photography," which he gave to the London and district section of the Institute of Photography on October 12 at the Caxton Hall, Westminster.

Mr. McMaster described in detail the manufacture of both cellulose acetate and nitrate bases for sensitized material, and gave a good deal of little-known information regarding the problems of the photographic material manufacturer. The most elaborate care is taken to ensure perfect cleanliness—that is, freedom from dust, which would play havoc with modern substandard cine and miniature camera films—and also to maintain an absolute uniformity not only in the thickness of the film but also in width and surface. The chemical constitution of the base has to be carefully regulated, so that it has all the desirable physical properties of strength, flexibility, low water absorption, etc., and does not in any way affect or influence the highly sensitive silver emulsion. The stabilization of the film by means of plasticizers, special solvents, etc., is one of the most closely guarded secrets of the manufacturer.

Although cellulose acetate can be used fairly successfully in the manufacture of substandard cine films, it is not yet suitable for the production of roll films for amateur photography. Mr. McMaster attributed this to the fact that the acetate had much greater water-absorption properties than the nitrated cellulose base, and in consequence there was a tendency for the former to swell during development and processing, and for the emulsion to frill and strip.

Apparently all forms of cellulose, such as benzyl, xanthate, ethyl and the triacetate have been tried out for making film bases, but the nitrated form is still the most suitable for all-round use. The lecturer predicted, however, that a more extensive use would probably be made of the triacetate base of the type now being used successfully in Germany.

Mr. McMaster was enthusiastic about the future of moulded lenses, and said that many of the early teething troubles had now been overcome. So far plastic lenses had only been used for simple meniscus and finder lenses, but now that they could be manufactured in a hardened and practically scratchless form considerable developments in the production of compound lenses might be expected.

Moulded camera bodies made of reinforced phenol formaldehyde resins had, said the lecturer, both advantages and disadvantages. Their streamlined appearance and light weight were very pleasing to the eye and contributed largely to sales, but they were inclined to be somewhat bulky and rather fragile. Mr. McMaster thought, however, that the future of the moulded camera was quite bright and its popularity assured once these disadvantages had been overcome.

Not only is plastic material extensively used in the production of bases, but a wide use is made of the vinyl chlorides, acrylic resins, etc., for making special corrosion-resisting equipment. Mr. McMaster showed various examples of such equipment which, he said, had been produced at the works of Kodak to solve certain difficulties in production. Apparently there is a growing field in photographic manufacture for such materials as Mipolam, which can not only be used in the form of tubes for conveying corrosive fluids, but may be fabricated into intricate shapes for specialized purposes. The importance of keeping the silver emulsion away from all contact with metal owing to the risk of the metal coupling up with the silver is also responsible for the choice of plastics for new pieces of equipment. According to the lecturer, Messrs. Kodak have solved many intricate works problems by the use of plastics.

At the conclusion of the lecture Mr. McMaster showed a number of lantern slides in monochrome and natural colour, prepared from photographs taken by himself whilst on holiday in the Swiss Alps and Austrian Tyrol, Germany, etc. These slides were greatly admired by the audience, and the Kodachrome transparencies were generally considered to be exceptionally fine specimens, showing to advantage all the many colours of the glorious mountain scenery and proving very conclusively that colour photography is now a reality within the grasp of every amateur photographer.

BREEDING FLIES IN PLASTIC BOXES

For testing out the efficiency of various pyrethrum fly sprays some manufacturers in the United States are now using specially designed boxes made of "Cellophane," cellulose acetate sheets and even Plexiglas. The advantages claimed for these plastic materials over glass are that they can easily be bent into any desired shape and used for constructing boxes or breeding places of original design; in addition to this they enable the ultra-violet portion of the light to pass through, whereas glass acts as an effective barrier to a considerable portion of it.

The ultra-violet rays are very helpful in maturing flies quickly and speeding up the transformation of maggots to flies. When "Cellophane" is used for these boxes it can be continually replaced without much trouble or cost, and this saves a good deal of troublesome cleaning.

BAKELITE RESINS

Being the story of artificial resins, that is, as created by man from simple raw materials such as carbolic acid and formalin, replacing and indeed improving upon the materials slowly made by Nature in plant life and moreover creating new industries that have been the wonder of the twentieth century. Also there are here described the methods of manufacture of these materials and their scientific control as carried out by Bakelite Ltd. at their Tyseley works in the city of Birmingham.

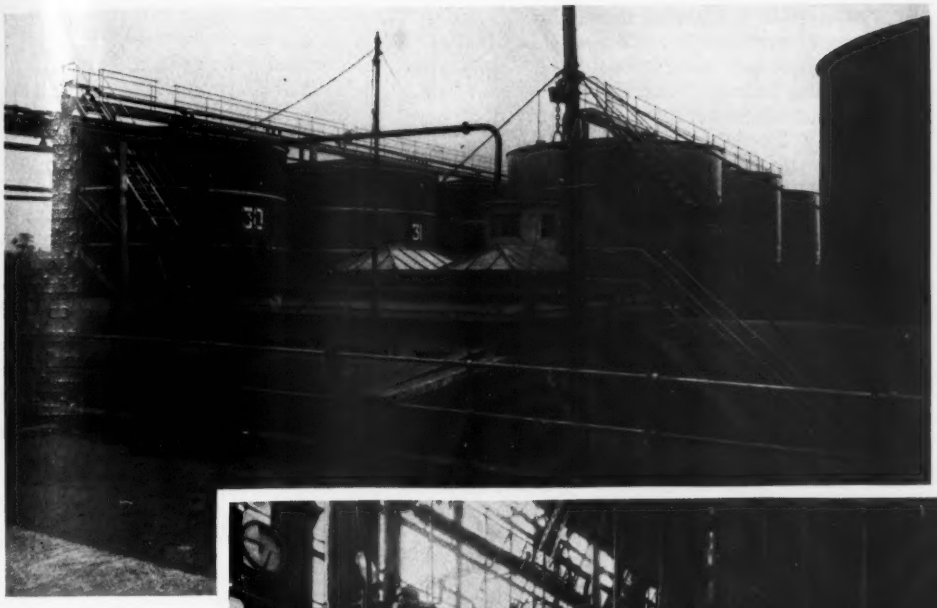


Fig. 1.—The tank "farm" for storing phenols at Tyseley.

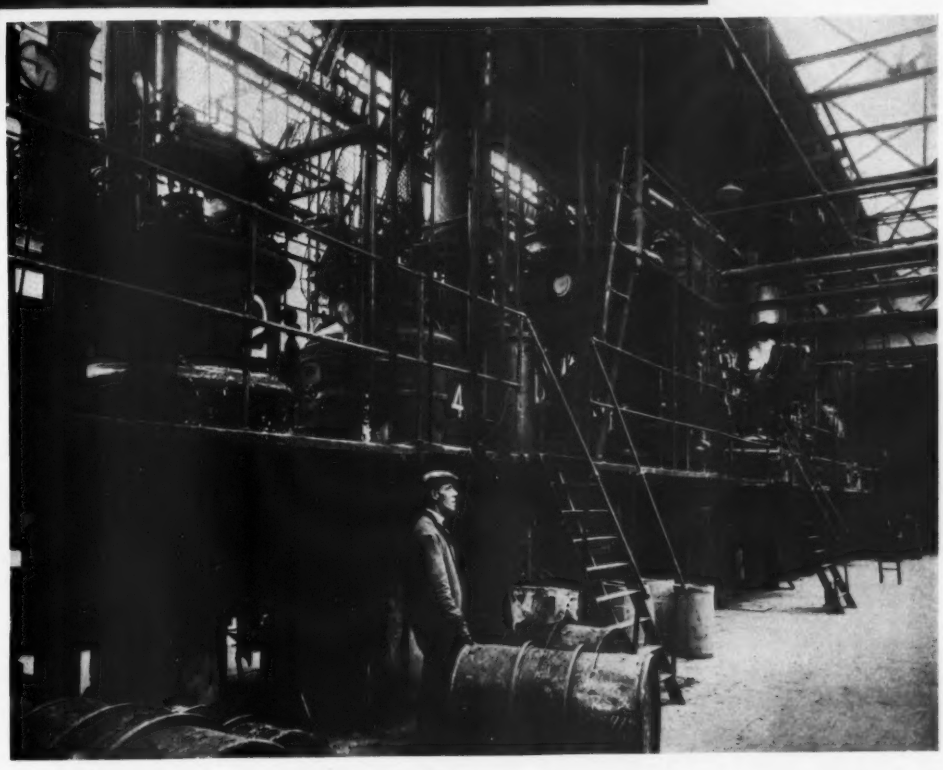


Fig. 2.—A battery of stills for the manufacture of Bakelite resins.

ORGANIC chemistry, the section of chemical science that deals with the compounds of carbon, has been the source of much fascinating and fruitful investigation, elucidating many difficult problems, creating many new industries, of which explosives, dyestuffs soaps, photography, artificial silk and the production of synthetic vitamins are good examples. Because of this study synthetic resins have been discovered; without it they would never have reached economic production.

This is not to say that synthetic resins were not produced before the dates variously given for their discovery, for doubtless the earliest workers in organic chemistry found that under certain (or perhaps one should say uncertain) conditions resins or tarry materials were accidentally produced. But they were neither desired nor was their formation understood. Almost every chemist has encountered this trouble when working on dyestuffs or intermediates for dyestuffs, and more especially on those made from carbolic acid or its compounds with nitric acid. It is not pleasant to get a nasty black tarry mess in one's flask instead of beautifully clear liquid or crystal.

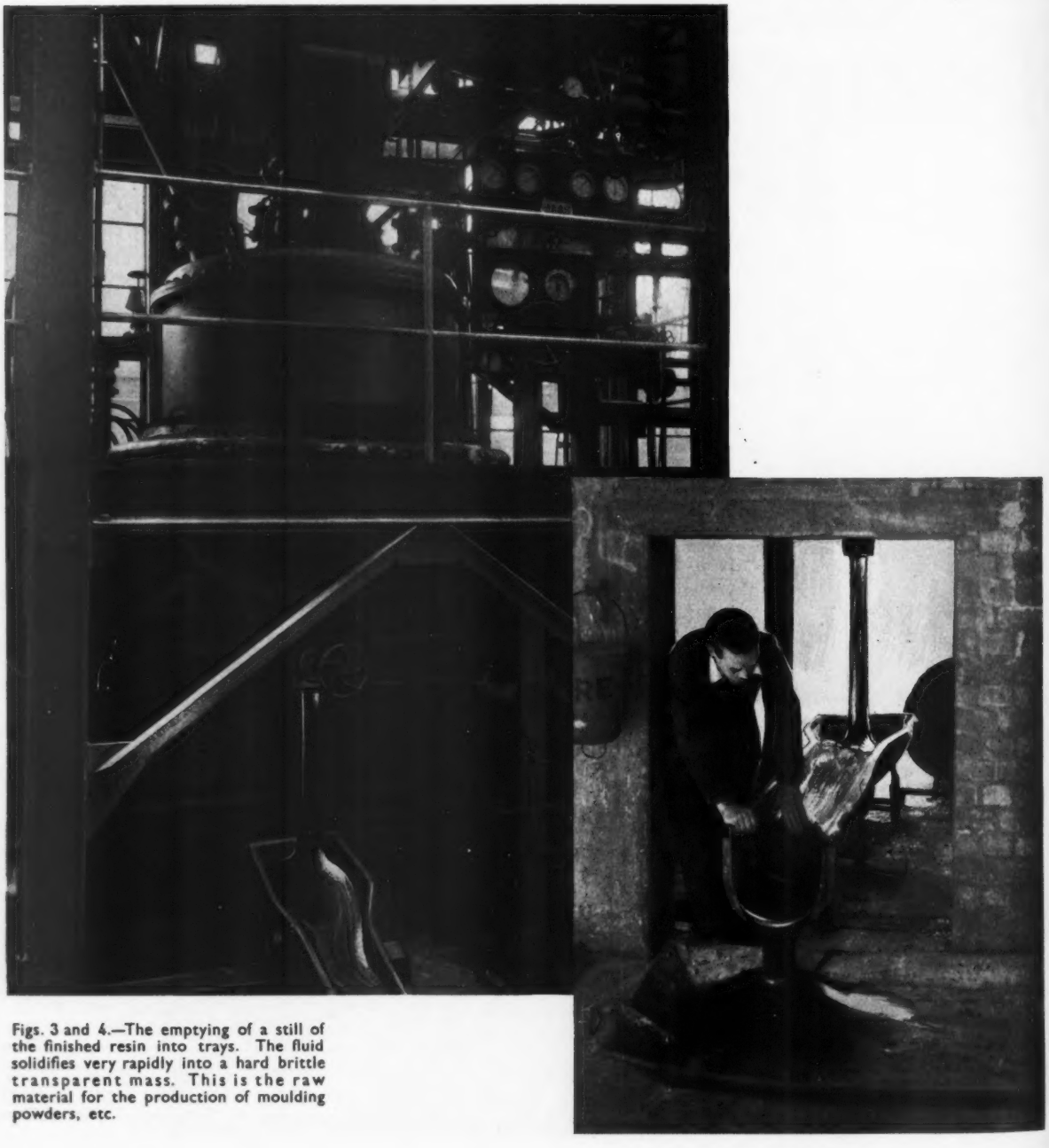
Gummy or resinous formations are also encountered in other spheres where they are not wanted. For example, in the production of gas and benzol from coal, resin formation is a great nuisance, while the growth of sticky insoluble materials on exhaust valves is within the knowledge of every motorist.

The method of production of almost all resins, wanted and unwanted, is very similar; they are formed by the joining together of certain types of molecules of an organic nature, sometimes similar, sometimes different, to form much larger molecules. The large size and shape of these molecules give resins their characteristics.

Natural resins are certainly formed in this way in the tree or plant from which they eventually exude, although the exact mechanism is not yet understood. Some, like Chinese lacquer or gum benzoin, resemble those synthetic resins we are about to describe, for they are formed within the plant by the interaction of carbolic acid-like compounds with other organic substances.

There had long been a desire by the varnish industry to replace the natural resins by synthetic materials—partly because the natural material is often adulterated, dirty and varied in quality, partly because they are derived from distant countries and subject to wide variations in price, and partly because it was hoped to improve on them. This industry at least was ready for their introduction 30 years ago.

The first recorded systematic work was that carried out by several German workers. As early as 1853 Gerhardt showed that a resinous and insoluble mass could be obtained from salicyclic acid, a derivative of carbolic acid, and in 1872 Bayer discovered that the reaction between carbolic acid (chemically called phenol) and formalin (chemically called formaldehyde) was quite general to most compounds which belonged to the same families. Carbolic acid or phenol is the best known of a family of similar compounds generically called "phenols." Others belonging to the same family are cresylic acid (usually employed in making "lysol") and thymol, the well-known disinfectant. Formaldehyde belongs to a family of chemicals known as the "aldehydes," of which acetaldehyde is another member. Bayer's discovery, then, showed that any phenol and any aldehyde could be made to form hard synthetic resins, which at certain stages could be made infusible.



Figs. 3 and 4.—The emptying of a still of the finished resin into trays. The fluid solidifies very rapidly into a hard brittle transparent mass. This is the raw material for the production of moulding powders, etc.

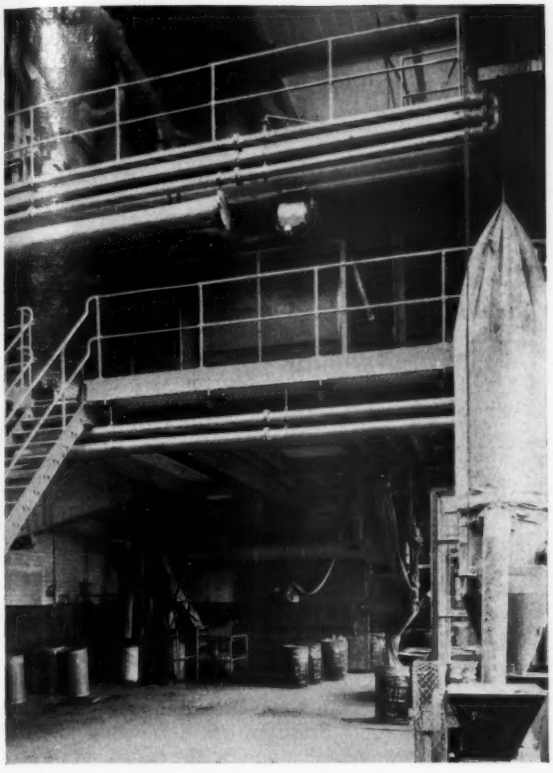


Fig. 5.—The resin from the stills is powdered and mixed with wood-flour, etc., to produce moulding powders. Here is seen a large mixing plant and, below, filling and weighing machines.

Workers in many other countries, France, England and the United States, continued the work, but it was not until the first decade of the 20th century that the systematic investigations of the reaction between phenol and formaldehyde by Dr. Baekeland, the famous chemist, made manufacture possible.

Thus the first of the commercial synthetic resins were created and were given the name Bakelite in honour of their discoverer. Dissolved in alcohol they became substitutes for shellac in lacquers and insulating varnishes, and dissolved in drying oils they have largely replaced the natural gums and resins. Mixed with special fillers they immediately found their greatest use as moulding powders for the manufacture of electrical goods, for by heat and pressure in moulds they were converted into strong infusible objects of high dielectric strength. To-day they are used for the thousand and one objects we see in almost every industry.

In England much work had also been carried out on phenol-formaldehyde resins, and in 1910 the Damard Lacquer Co., Ltd., were producing lacquers for replacing shellac varnishes. By 1916 this company produced its first moulding powder, and so began in this country an industry whose products are employed in almost every field of technique and art. In post-war days things moved apace, and 1926 saw the amalgamation of Damard Lacquer Co., Ltd., and other companies that had been formed into Bakelite, Ltd.

A new factory was erected at Tyseley, Birmingham, and has since been in a continual state of growth. It stands as a monument of the application of chemical science to satisfy the needs of industry.

The factory covers some 30 acres, and manufacturing activity can be divided into three main sections, one dealing with the production of the pure synthetic resin, a second covering the conversion of this resin into moulding powder, and a third devoted to the impreg-

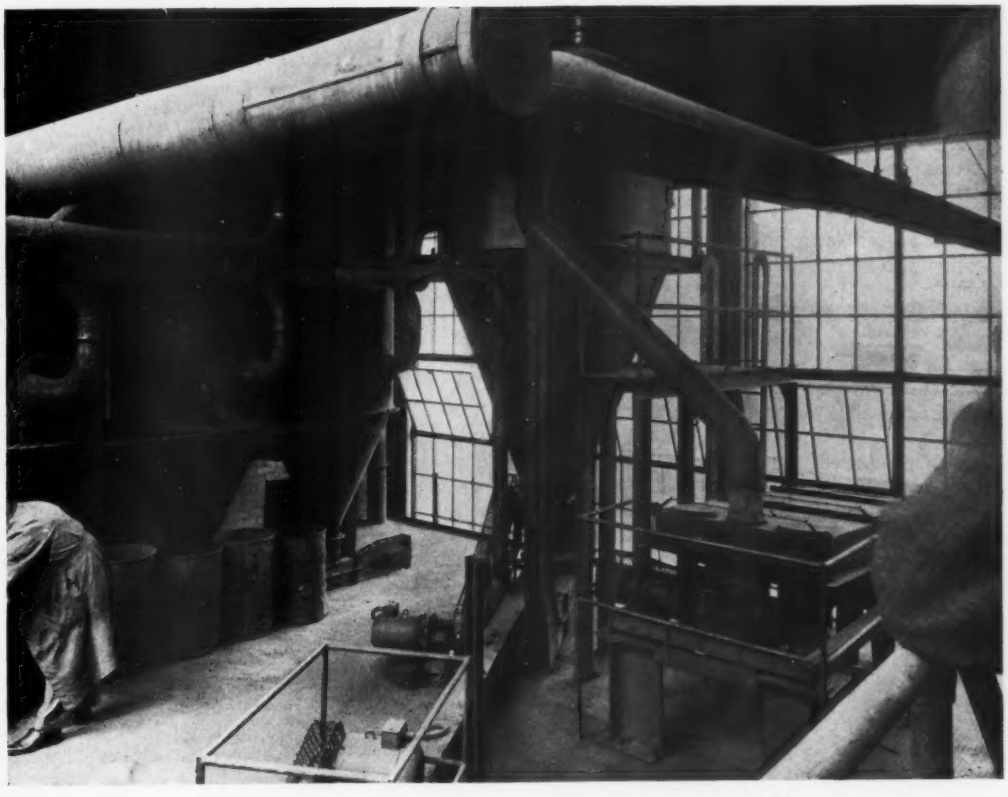


Fig. 6.—A sifting machine and dust separators in the same building.

nation of paper and similar materials with synthetic resin solution to produce laminated sheets of many types and for many purposes.

Production of Phenol-Formaldehyde Resin

From the research of Dr. Baekeland and the other workers it was evident that success in production depended on the manufacture of a continually consistent material that did not vary from batch to batch. This in turn depended on very exact control of the chemical reaction between phenol and aldehyde at every stage of manufacture and again on control of raw materials and strict examination of the composition and suitability of finished resin or moulding powder for the purpose they were ultimately to fill. We can now take our peep into the Tyseley works to see how these objects are fulfilled.

The most important raw materials are pure carbolic acid, cresylic acid which belongs to the same phenol family, and formaldehyde. The different phenols are used to give slightly different resins as required. Both are produced by the distillation of coal tar.

The pure carbolic acid is a white crystalline compound and arrives in large drums. The cresylic acid is a liquid and is transported to the factory, also in drums or in tank wagons, from which it is pumped to the huge storage tanks seen in the photograph Fig. 1. Formaldehyde is actually a gas, but commercially comes on the market as a 40 per cent. solution in water. From each batch samples are taken and immediately forwarded to the control laboratory for analysis, for each must conform to rigid specifications.

The reaction between carbolic acid and formaldehyde under heat is known in chemical language as a condensation reaction, that is molecules of carbolic acid join directly on to the formaldehyde molecules progressively forming a larger molecule. At the same time water is formed and is removed to leave the resin behind.

This must also be noted. The reaction between the two materials if simply mixed alone is too slow for economic production. But it has been discovered that a very small quantity of a third substance, called a catalyst, such as ammonia or sulphuric acid or certain other chemicals, hastens the reaction enormously and so enables large quantities of resin to be produced in a relatively small space of time.

Fig. 2 shows a part of the large building in which the resin itself is manufactured. Here will be seen a portion of a battery of stills, each of which can produce about a ton of finished resin per batch.

The stills, in effect, are copper or stainless steel vessels totally enclosed but fitted with inlet pipes for feeding in the raw materials, carbolic acid, formaldehyde and catalyst. They are also fitted with an outlet pipe from which the water formed during the reaction and that which is originally present can be removed by distillation and vacuum and in the base with an outlet pipe and valve for the removal of the finished resin. The stills are all jacketed and steam heated, and a stirring device is provided to mix the materials.

About equal quantities of phenol and formaldehyde are pumped in each still and a very small quantity of catalyst is added. Heat is applied by admitting steam into the jacket, but at about 70 degrees C. so much heat is evolved between the reacting materials that the process continues without additional heat. After a short period the water is allowed to distil over and the last traces of it are removed by vacuum and heat.

Phenol-formaldehyde resins may take two forms, depending on the ultimate use. One is a syrupy liquid employed for making cements and for the impregnation of paper and fabrics, and the other is a solid used for making moulding powders and for use with linseed and other drying oils as varnishes and paints.

According to which of these is desired so the heating of the resin in the still is stopped at an early or later stage.

If impregnating resin is required, industrial alcohol is added when the syrupy stage is reached. Thus a thin solution in alcohol is the final product here.

If the solid resin for making moulding powders is required the heating is continued until by cooling a sample a solid bright and clear resin is formed. This must be somewhat brittle but not sticky.

Figs. 3 and 4 show the emptying of a still of finished resin. This is quite fluid in the hot state but solidifies rapidly on cooling when run into trays.

The Manufacture of Bakelite Moulding Powder

The solid resin thus produced is still potentially very reactive and on further heating, as is carried out in a moulding press, changes to a still harder compound incapable of being used. For the manufacture of Bakelite moulding powder, however, the pure resin is never used alone. It is ground up with fillers, wood flour being the most common, to give special properties to the finished moulding. Colours are added as required.

The next process, then, is a mixing of coarsely ground pure resin with wood flour and other materials in a huge rotating drum where the ingredients are intimately thrown together and evenly distributed. This mixing is followed after sifting by a mastication or rolling between horizontal steel rollers which are steam-heated. The action here is a tearing and grinding one, and since the rollers are hot the mixture becomes plastic and the fillers become thoroughly incorporated into the resin.

This dough-like material, perfectly homogeneous now in composition, is cooled and so again solidified and is broken up by passage through a disintegrating machine into powder or flake form. This is the Bakelite moulding powder as supplied to the moulding factories.

Needless to say, before it leaves the factory, it undergoes stringent tests not only for its flow properties to ensure proper behaviour in the mould, but also special tests to ensure that the finished moulding will stand up adequately to the requirements demanded of it. These include mechanical strength tests, tests for dielectric strength if the material is required for electrical purposes, water absorption tests, heat tests, etc.

Production of Laminated Sheet

A vast quantity of this type of material is made by impregnating sheets of paper or fabric with resin. Several of these sheets are superimposed and compressed under heat, resulting in a strong, tough and virtually imperishable material which is widely employed in sheets, tubes and rod form in the electrical industry, or as sheets in decorative construction.

The method of impregnating paper is shown in Fig. 7. The paper is run from a roll through a bath of an alcohol solution of resin. The paper is thoroughly impregnated and then passes wet into a heated enclosed chamber, where the alcohol is driven off leaving the resin behind in the pores of the paper, which increases about 50 per cent. in weight. This treated and dried paper is then cut off into desired lengths. In the making of laminated material intended for the production of decorative veneers, a number of these sheets (7 ft. by 3 ft. and 8 ft. by 4 ft. are now standard sizes) are

PRODUCTION OF LAMINATED SHEET

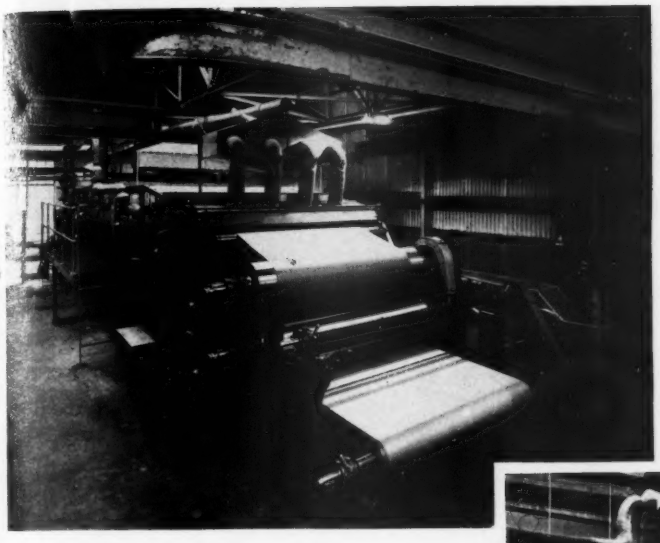


Fig. 7.—Sheet paper is passed through a solution of synthetic resin in alcohol. The alcohol is then driven off by passing the paper through the drying tunnel seen in the rear, leaving the paper impregnated with resin.

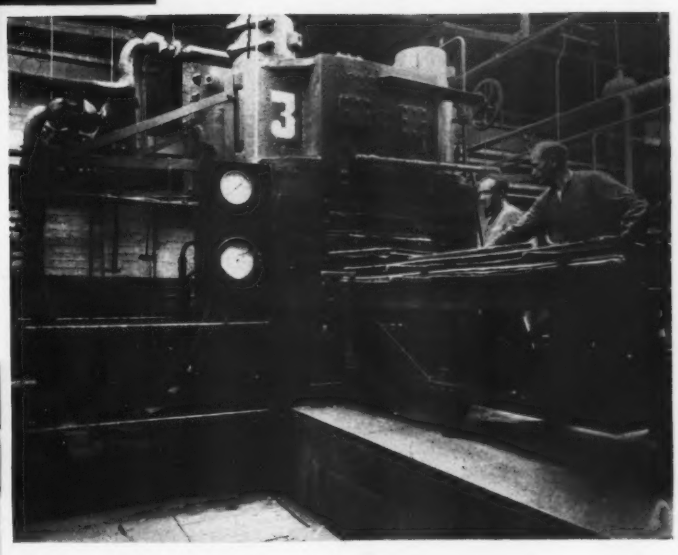
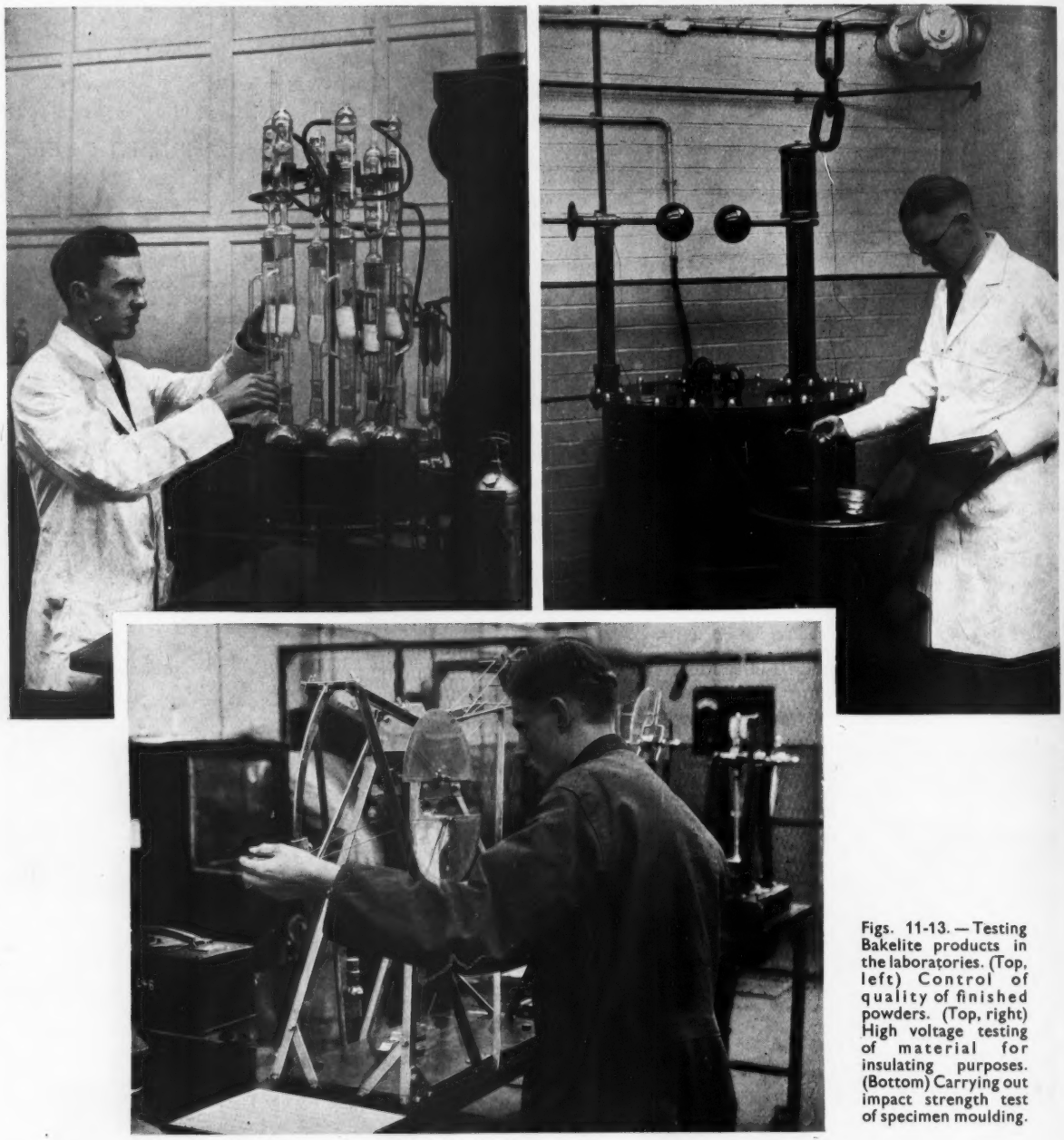


Fig. 8. — A number of sheets thus impregnated are introduced into a press, where heat and pressure consolidates and cures them.

Fig. 9 (left).—Inspection of Bakelite decorated sheet.

Fig. 10.—Testing laminated material for thickness with an indicating micrometer.



Figs. 11-13. — Testing Bakelite products in the laboratories. (Top, left) Control of quality of finished powders. (Top, right) High voltage testing of material for insulating purposes. (Bottom) Carrying out impact strength test of specimen moulding.

stacked on top of one another and placed between two highly polished metal sheets. This pile is then placed with other similar ones in a hydraulic press where, under high temperature and a pressure of one or two tons per square inch, the pack is consolidated and the resin hardened. On cooling, the single laminated sheet is removed. As will be readily understood, a decorated sheet is obtained by including an impregnated sheet bearing the design, as the topmost in the pack. As a veneer united to a wood base such sheets are widely used for panellings, doors and table tops.

By substituting special fabrics for paper, thick blocks for making gear wheels and bearings are produced. Then, again, similar types of resin form the basis of adhesives used in the manufacture of plywood for aircraft construction.

This brief glimpse into the factory of Bakelite, Ltd., will give the reader some idea not only of its magnitude, but also of its importance in relation to the outside industrial world. For, indeed, it would be difficult to point to any industry and any household that is not affected by it. The electrical industry, shipbuilding, furniture, heavy and light engineering, the fancy goods and container industries, aircraft, building, the chemical factories, agriculture—the tale is without end—all employ in a hundred and one shapes, as laminated material, as moulded forms and as varnishes, the products resulting from the reaction between those two simple chemical compounds, carbolic acid and formaldehyde.

In its history, chemistry has served the world well. In Bakelite resin and its many sister-compounds, chemical science may be said to have reached its apotheosis.

This page shows a few of the finished goods that have been made from Bakelite. Most of them will be readily recognized. Half-left is a conveyor-belt chain, and top, right, is a Bakelite-bonded grinding wheel.

A worker using the latest type of colorimeter in the new I.C.I. Research Laboratories, Manchester. Colorimeter analysis technique has been developed so highly as to enable the detection of one hundred-millionth of a gramme of impurities in the dyes used in the textile, leather and rubber industries.

★

One of the latest forms of sealing doors and windows against gas consists of wooden panelling in which thin strips of latex rubber cushioning (Dunlopillo) have been embedded. The panelling, with its projecting strips of cushioning, is clamped to the door frame and floor, and the rubber is compressed to form an air-tight fitment, which is both neat and foolproof.

★

According to a recent patent, B.P. 481,871, porous indiarubber having pores of controlled size can be obtained by milling into a crude natural or synthetic rubber grains of such substances as starch, albumen and meat fibrin. During or after the process of vulcanization these grains are dissolved out and thus render the rubber porous. Articles such as grooved battery separators and filter sheets having a perforated metallic reinforcement between two sheets of the rubber may be made by the new process.

★

The idea of using rubber for bandages is the subject of a new patent, B.P. 481,823. The raw rubber is thoroughly masticated and cleaned. It is then treated with certain antiseptic bodies, which are retained by the rubber at ordinary temperatures but discharged by the heat of the body when the bandaging material is applied.

★

Behind the scenes in motorcar production rubber finds a multitude of uses, not only for silencing purpose in the form of pads, Dunlopillo upholstery, etc., but also for lining purposes. The new Alvis model, the 4.3 litre, which is of the super-car order, is equipped with an enclosed luggage locker which is lined in white rubber. The lowered lid of the locker forms a platform on which a trunk can be carried. Needless to say, this smartly equipped luggage locker was much admired by visitors to the 1938 Motor Show, who were not slow to assess its usefulness and the finishing touch it gives to a real luxury car selling at £995.

★

According to the Swedish correspondent of *The Times*, a safety device to protect those occupied in drilling stone from silicosis, caused by inhaling the fine dust, has been invented and perfected in Sweden by Mr. Ruben Carlsson, of Stockholm. The invention consists of a specially designed rubber cap enclosing the drilling tool and an ingenious little suction apparatus, the so-called "ejector," driven by compressed air from the compressor for operating the tool. Through a piping the cap is connected with the ejector, which draws off the dangerous dust from the spot where the drilling takes place. The device consumes only 350 litres of compressed air a minute and is thus economic in use.

★

The rubber-proofing industry will shortly be organized on a national basis and preliminary steps were taken on October 12 at Manchester through an association covering every section of the industry. Resolutions were passed by representatives of the garment makers, cloth suppliers, proofers and dyers for a rubber-proofing trade advisory conference. Further, that a garment makers' committee be formed and that representatives of the cloth suppliers, proofers and dyers be co-opted to meet and subsequently to report to the Rubber Proofing Trade Advisory Conference.

★

Since the introduction of synthetic rubber, such as Neoprene, Buna and Thiokol, attention has been devoted by rubber technologists to the question of providing strong adhesives with which the new material can be bonded to natural rubber, wood and metal, etc. One of the most satisfactory adhesives so far tried out is a specially compounded solution of synthetic resin in alcohol. A recent patent, B.P. 489,764, covers the manufacture of adhesives of this type. Rubber bonding adhesives should prove very useful to manufacturers in a number of different industries.

The outstanding luxury model at the Motor Show featured CATALIN dashboard, window fillets and dados.

CATALIN is an ideal material for car furnishings, combining unusual beauty with toughness and strength. It resists alcohol, oils and all common acids. It can readily be converted into the finished product without the use of special machinery or expensive tools and dies.

The illustration shows 4¼-litre Bentley Coupe. Bodywork by: Messrs. Park Ward & Co., Ltd., 40, Conduit Street, W.1.

CATALIN LIMITED · WALTHAM ABBEY · ESSEX

As in a watch

the perfect synchronisation of the component parts make the perfect movement, so in the manufacture of U.G.B. bottles and caps the pooling of resources and co-ordination of production make the harmonious whole—
the perfect pair.

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★

A transparent rubber gas mask has been suggested in a recent patent, and the idea seems quite sound. The inventor puts forward a method of forming the mask as a single seamless article by applying a solution of suitable rubber derivative (or cellulose acetate, etc.) to a former of the required shape by dipping, spraying or brushing. A number of layers may be applied, and the former can be of glass, metal, rubber, wood or wax. It is suggested that reinforcements of textile material or wire gauze and fittings such as screw nipples and fastenings may be applied to the mask during or after the coating process, and with or without the use of adhesive. The British patent referred to was taken out by Mr. P. Stock and is number 481,627.

In connection with air raid precautions it is interesting to note that chlorinated rubber has been suggested for sealing windows, doors, packing cases and the like against poisonous gases and arsenical fumes. The rubber is dissolved in a suitable solvent containing linseed or ricinus oil and mixed with finely divided asbestos and anti-gas agents, such as urotropine and chloramine-T. Apparently the mixture is wrapped in wax cloth, sail cloth or gauze to form tubes, strips or cords which can be used for sealing purposes.

★

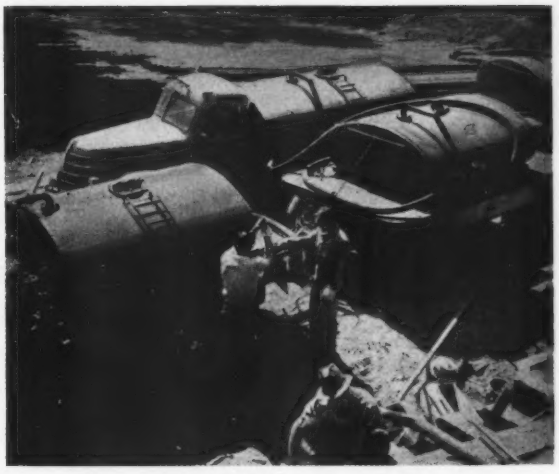
A new chlorine disinfectant has been developed which is specially adapted for sterilizing rubber gloves and, in fact, all surgical appliances made or partly made of rubber. It consists of an aqueous solution containing one part of iodine in 50 parts of a 4 per cent. solution of potassium iodide and Dettol. A two-minute treatment of rubber gloves heavily infected by streptococci gave complete sterility from non-sporing organisms.

★

It is surprising how the electric hare stands up to continual "killing" by the race-track dogs. Sponge rubber is used for the real body of the animal, which is covered with rabbit skin. Thirty rabbit skins are required every week on a well-patronized track, and the hare comes in for a great deal of mauling, which, however, does not injure the sponge rubber very much. This strange use for cellular rubber illustrates the amazing versatility of the material, which is now being used in film studios for making all kinds of realistic dummies.

★

Two interesting new uses for Thiokol have been sent to us by Thiokol Corporation, Yardville, U.S.A. The first deals with the rejuvenation of oil and natural gas wells. This is usually carried out by such specialist firms as Dowell Inc., who treat the exhausted wells with acids and chemicals, which crumble the barriers between imprisoned reserves and the well shaft. The regular crews then take over and pump the newly released oil or gas to the surface. An important part of the rejuvenation process consists of forcing acids and chemicals deep into the earth under great pressure. This is done by means of long lengths of acid suction hose lined with Thiokol synthetic rubber. Before Thiokol hose was universally adopted for this work, Dowell used an all-rubber hose and encountered considerable grief in failure of the liner. The strong acids literally ate away this part, and shortly thereafter the hose itself. In several cases Dowell reported complete failure occurred within three to four weeks. So far not a single failure has been reported with synthetic rubber hose, and this hose has been in use for over a year.



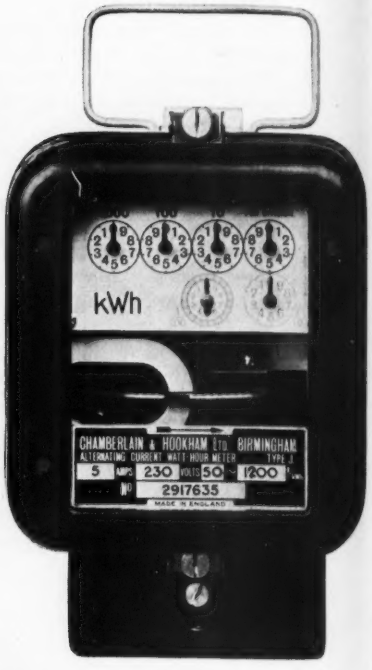
Dowell specialists with equipment all ready for treating exhausted well.

The second important new use for Thiokol deals with the manufacture of oilproof belts. L. H. Gilmer Co., U.S.A., are now making Thiokol belts, which can show a service record improvement of over 60 per cent., and hundreds of them are whirring away in paper mills, oil refineries, chemical plants and in other factories where particularly bad oil conditions are present. Adding months of life to flat belts and V-belts is only one important advantage of the improved product. By using the Thiokol belt it is possible to save valuable time now spent on replacement of belts rotten with oil and grease. L. H. Gilmer Co. have worked out a process by which a special Thiokol compound can be incorporated in the fabric belt by vulcanization. They are also able to treat leather belts with synthetic rubber, and so achieve a considerable improvement.

Fabric belt reinforced with Thiokol made by L. H. Gilmer Company, U.S.A.

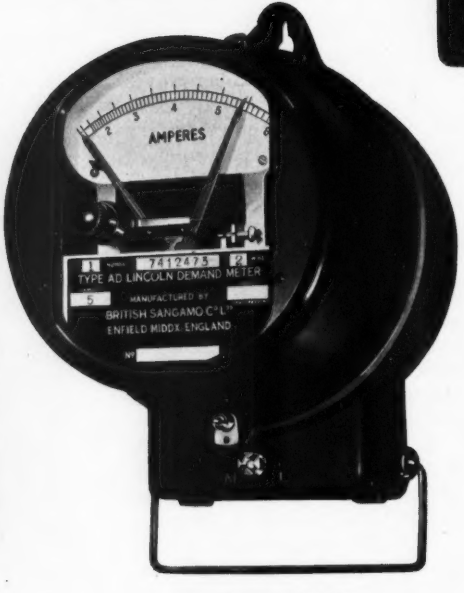
Moulded Electric Meter Cases Mean—

1. Better Insulation
2. Lighter Weight
3. No Earthing



(Top, left) Moulded prepayment meter made by Metropolitan Vickers, Manchester.

Sangamo multi-coin prepayment meter with variable-rate fixed-charge collector.

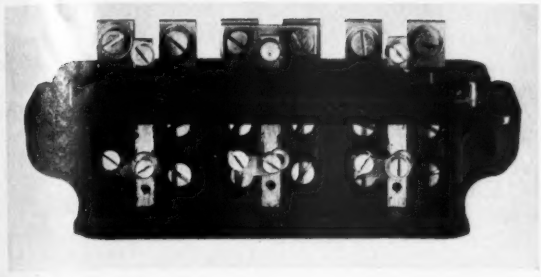


Sangamo Lincoln demand meter.

(Top, right) Single-phase alternating-current meter moulded of Bakelite by G.E.C.

DURING recent years considerable progress has been made in meter design, especially in the case of prepayment meters, some of which are quite complicated in design, although simple in operation. It is now becoming a practice with some electrical supply companies to install prepayment meters which operate in conjunction with a fixed-charge collector. The latter is used to meet the requirements of modern tariffs and hire-purchase schemes, which necessitate the collection of a certain sum, easily variable, over a definite time period. Some of the most progressive meter manufacturers now house the collector and prepayment attachment in a moulded phenolic resin base and cover. The collector is designed on the unit principle and is attached to the right-hand side of the prepayment mechanism by two screws only, correct alignment and efficient meshing being ensured by dowel pins. Thus the collector can be fitted to or removed from the prepayment mechanism in the simplest possible manner, and ordinary prepayment meters of the large base pattern can be stocked and used as such, with the option of converting them into fixed-charge collector meters at a later date.

The reasons which have prompted meter companies to use moulded cases for their meters may be summed up quite briefly. The first reason is that Bakelite and similar materials afford a very high degree of insulation, which is of the utmost importance both to the supply company and the consumer, who is naturally concerned about the safety factor of the meter. The use of a moulded case also does away with all necessity to earth the device, which means a saving in installation costs and a reduction in the time necessary to install the meter. The moulded meter is light in weight and simple to test, all parts being readily accessible upon



Metro-Vick moulded terminal block for attachment by means of screws to metal case of house-service meter.

removal of the cover. Its appearance is neat, and the permanent polish of its plastic housing simplifies cleaning and eliminates maintenance costs, such as painting. Electricians are well aware of the deterioration of metal meter cases in damp cellars and basements, and the fact that moulded ones are completely unaffected by damp and even corrosive fumes is fully appreciated. Referring briefly to the strength of the moulded meter base and cover, it may be said that when properly designed so as to include strengthening ribs, these new meters give every satisfaction and the breakage percentage is remarkably low. Another factor of considerable importance to the productive side of meter manufacture is that once the tools are made, the moulding of cases, bases, knobs and all necessary parts becomes not only a comparatively simple process, but a very accurate and rapid one. The use of phenolic resins of the Bakelite type for meters, therefore, speeds up the entire manufacture and renders the works manager independent of uncertain metal supplies, wide fluctuations in the price of metal, and also the troublesome cost and lengthy processes of metal casting and finishing.

Where it is required to manufacture meters with special characteristics, say ability to remain unaffected by exposure to moisture, corrosive gases or continual vibration, then it is possible, by the use of the properly adapted moulding powders, to achieve perfectly satisfactory results. The meter industry is now fully cognizant of the benefits of using plastics and manufacturers have reorganized their plant to cope with moulded work on efficient mass-production lines.

Although moulded prepayment meters and collectors have been described in some detail, it must not be thought that these are the only ones now being moulded. A large and increasing number of alternating-current watt-hour meters are available with Bakelite base and cover, also single-phase, polyphase, semi-switchboard, demonstration meters, etc. The Sangamo type A.D. single-phase Lincoln Demand Meter is a typical example of a modern meter in a moulded housing, which has been developed for the measurement of the maximum demand on either alternating-current or direct-current two-wire circuits. The outstanding feature of this meter is its simplicity both in design and in operation. Its construction, which is simple and strong, ensures a long life of sustained accuracy and low maintenance costs.

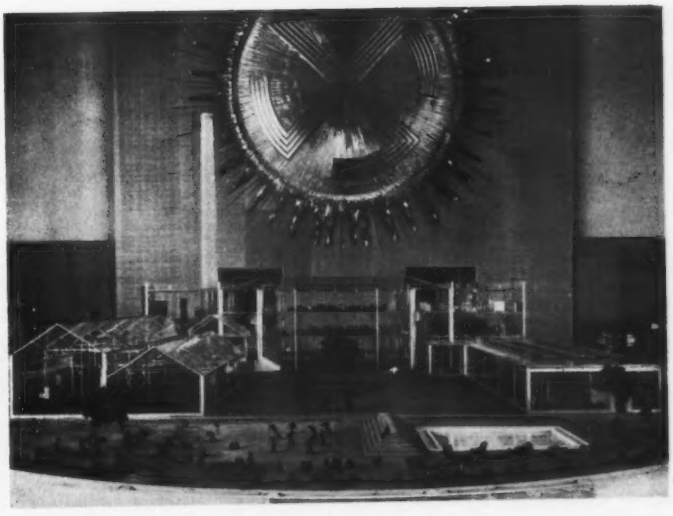
The same sound reasons which are encouraging meter manufacturers to use plastics are also responsible for a growing interest in the possibilities of plastics by manufacturers of all types of electrical apparatus. It is certainly satisfactory to be able to record that the electrical industry, always the most important consumer of thermosetting plastic materials, is likely to become more closely linked up with plastics in the near future.

"The GLASS FACTORY"

Plexiglas Finds Increasing Uses in Germany for Exhibitions and New Building Work

THIS large model, made entirely of "Plexiglas," was shown at the Berlin Exhibition "Gesundes Leben—Frohes Schaffen," where it attracted a good deal of attention. "Plexiglas" is finding a number of interesting applications in Germany, especially in the building trade, where, in spite of its relatively high cost, it is preferred to glass for some specialized purposes as it allows a greater percentage of ultra-violet rays to pass through. In the construction of models for exhibitions and museums, etc., there is no doubt that the German authorities are making generous use of "Plexiglas," because, by reason of its amazing clarity, it facilitates perfect vision. The material offers no difficulties in handling or fabrication provided ordinary care is taken.

In this country, of course, similar applications are being found for Perspex, and at most important exhibitions the material finds some spectacular application.



Ideas—

By the EDITOR

On Getting Married

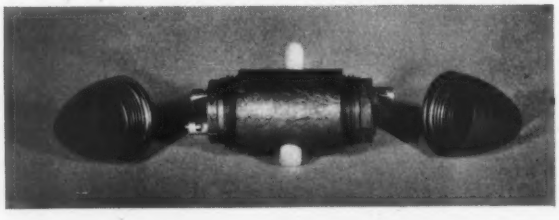
Apparently, prior to getting married, young couples always go to Bravington's to buy their rings, and remember that remarkable slogan, "Every girl sees a home through her engagement ring." With such enormous business, therefore, there is little wonder that some special apparatus is necessary to cope with the staggering demands for rings of various

sizes, for the ladies come slender fingered and—not so slender. If they were men I'd have the courage to say skinny, stubby, fat and knobbly.

Anyway, the variety of sizes has necessitated a sensible means of measuring fingers, and Crystalate, Ltd., with their usual brilliance, have produced the model shown in the photograph. It is made of two circular discs rotatable about a central axis. As each contains half a dozen or so gauges, all types of digited-beings are provided for.

Art in Electrical Goods

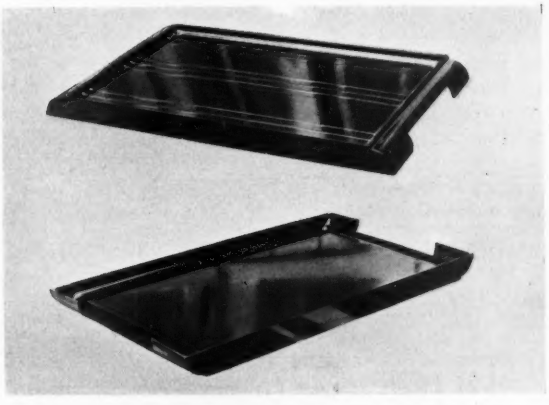
This is, I believe, the first attempt by any manufacturer to produce a complete electrical accessory in cellulose acetate. Lacrinoid Products, Ltd., are responsible for the interesting new pendant switch illustrated below, which is, of course, obtainable in a wide range of colours, including striking pearl effects.



By the injection moulding process it is possible to produce the fitting at a price which compares very favourably with the type usually made of metal or wood. An important selling point is that, whereas both metal and wood eventually lose their smart surface finish, cellulose acetate or, indeed, any other plastic, is absolutely permanent, as both colour and texture penetrate right through from one end to the other.

New Tray Design

Mr. Leslie Mansfield, of O. C. Hawkes, Ltd., sends me two photographs of a new tea-tray of plastics that has been developed by this company. It will be available in black, ivory and sundry other colours. Mr. Mansfield writes:—"I think that the most interesting point is that in designing the tray for comfortable use, we found that we had evolved a section



which resulted in the tray being used either way up. In the one photograph it is shown with the fluted surface as the tea-tray, and by virtue of its deep rims, etc., becomes admirably suitable for nursery use. Another minor point I would like to mention is that the thickness of the rim visible in the tea-tray photograph is thicker at the ends than at the sides. This arose from the need for ejection pins, and I feel has produced just the right touch to the design."

The upper photograph shows the tray as commonly used for tea, and the lower a view of the tray reversed or suitable for nursery use.

I offer my congratulations. It is a beautiful piece of work.

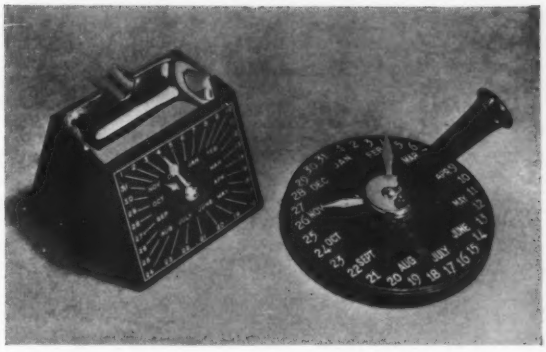
Air-raid Precautions

I have had several letters commending us for suggesting moulded helmets of plastics for use by air-raid wardens and eventually by the public. The Political Correspondent of the *Sunday Referee* complimented us by including the suggestion in his column of October 16. So much to the good, but I do hope that something will be done about it, and that it will not merely be taken as an airy thought and completely forgotten. From a report from Berlin I note that

"Field-Marshal Goering has promulgated a decree introducing an A.R.P. helmet for all organizations concerned with protection against air raids. The helmet is designed to protect its wearer chiefly from falling timber and masonry." That, as somebody has already remarked, "is the stuff to give them."

Desk Almanacs

The snag about almanacs and similar devices which remind us which day of the year it is, is that they are not clockwork, and one has to make a little effort to keep them up to date, or alternatively get one's secretary to do so. However, all gadgets which make this work simpler or more pleasant are welcome. The Smok-lok ashtray combines an excellent ashtray with an intelligently designed calendar. The paperweight and penholder also introduces a similar novelty. Both



are sold by Printator, Ltd., as advertising novelties, and were moulded by London Moulders, Ltd., Wembley, Middlesex.

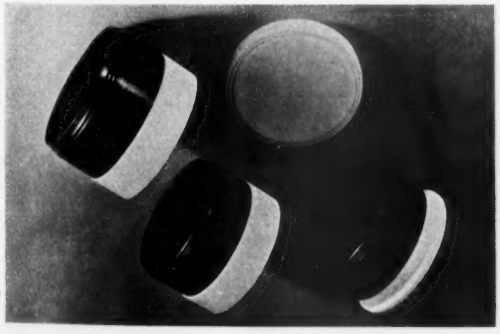
TWO-COLOUR MOTIFS

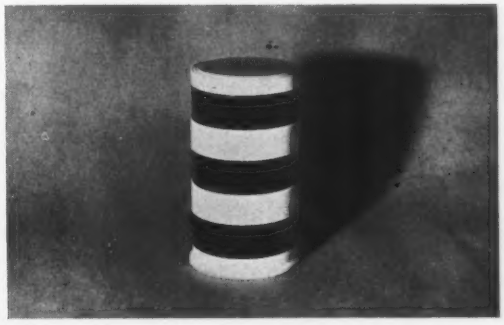
OUR American cousins are far more adventurous than ourselves in matters of colour and often in matters of design. In an effort to improve the balance we have often said so—judge our annual bleatings at the Earls Court Motor Shows.

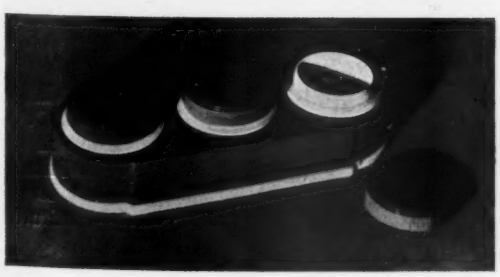
Now one of the most progressive of American moulding concerns is the Colts Patent Fire Arms Manufacturing Co., who at fairly regular intervals present us with examples of some of their most recent products. In the accompanying photographs are reproduced some which deserve special mention, for there is in each of them a two-colour motif.

It will be admitted generally, we believe, that the two-colour job is often an improvement on the one-colour job. At first sight it does not appear particularly adventurous, as it seems that one coloured portion is merely substituted for another of a different colour. But this is not so in the designs shown. For example, in the case of the first multiple cosmetic container there is a white lid and three containers. Each of these is composed of a white base and a black body sprung or glued on to the base. There are thus seven mouldings to this composite container, the enhanced beauty being attained at increased expense in moulding. This increase in cost in making seven instead of four mouldings is fully justified by results.

Another excellent example is that of the container consisting of three cosmetic pots fitted into a broad base. Here the two colours are pillar-box red and cream, there being eight units—three red lids, three cream-coloured receptacles and the base in two parts red and cream. Were the whole made in one colour only four mouldings would be necessary—three lids and the base and receptacles in one. From the design point of view Colts Patent Fire Arms Manufacturing Co. deserve special praise for the method of fitting the pieces together. The inner cream containers are sprung into a specially moulded base. The method is readily seen in the fourth photograph.







PRODUCTION

Practical Information dealing with Raw Materials, Moulding and Forming of all types of Plastics—Thermo-Hardening and Thermo-Plastic—Works-Organization, New Plant and Control Apparatus

NOTES AND COMMENTS

Metal-plated Plastics

IN our January issue this year we described some new developments that were taking place in this country in covering mouldings in plastics with chromium and other metals. A similar movement is apparent in the U.S.A., for a recent issue of *Modern Plastics* describes the introduction of this process in the fancy goods and other trades.

At first sight, plating seems diametrically opposed to the basic principles of plastics manufacture, that is where metal is not merely used as a decorative adjunct to the plastic moulding but as an entire covering. It is claimed, however, that the metal appearance is often required and that the plastic base makes for a cheaper object. Examples illustrated are "silver" beads, a silver-plated safety razor, gold-plated cast resin cigarette holders, etc.

Processes and Machinery

THE demand for the technical literature of plastics grows apace, especially for that section which deals with moulding processes. In truth, it is not abundant and the literature hitherto available in English is not as satisfactory as many would wish.

There has just been published, however, by Sir Isaac Pitman and Sons, Ltd., a book that is more satisfactory than most. "Processes and Machinery in the Plastics Industry," by Kurt Brandenburger, has been translated from the German by H. I. Lewenz, M.I.Mech.E., who has compressed the original two volumes into one. On the whole, the descriptions are of German practice and of German machines, although the translator here and there has introduced some illustrations of British factories.

The whole book is noteworthy for the detail in which materials, methods and machinery are described and for the inclusion of chapters such as Chap. III, Details of Particular Processes, which describes the making up of coloured mixtures and the production of grain, marbling and other effects. Another chapter of especial value is Chap. IV, which gives a list of the faults generally occurring in moulding. Such details are normally excluded in the literature.

The second part of the book deals with presses and the various moulding processes. This includes some valuable notes on mould design, although the book does not pretend to be for the designer. In short, this is a valuable compilation which we heartily welcome to our bookshelves.

As we presume the author or translator will not be averse to the pointing out of errors, so that they may be altered, we should like to draw attention to the very strange expression used on page 2: "100 grams watery solution of formaldehyde in 38 per cent. by volume of CH.OH." Also on page 3 the expression "wood-tar" should, we presume, be "wood-flour."

Kenneth Chance Scholarship

WE have pleasure in announcing that the winner of the Kenneth Chance Scholarship for Art Designers, to which we have frequently referred, is Mr. James Graham Cooke. Mr. Cooke, who is twenty years of age and has had experience in the designs department of a moulding firm, was educated at Woodhouse Secondary Public School, Finchley, where he gained the General School Certificate (University of London) in June,

1935, with six credits and two distinctions. He has taken up his Art study at the London County Council Central School of Arts and Crafts, Southampton Row, London, W.C.1, on a course suggested by the Principal, Mr. H. G. Murphy, who is a member of the Kenneth Chance Scholarship Committee of the Institute of Plastics Industry.

Inquiries and Answers

Marketing Ideas

Redcar, Yorkshire.

The Editor, *Plastics*.

Dear Sir,—I should be very grateful if you would tell me if a small object of household utility, constructed by myself from odd pieces of plastics, is likely to interest one of the moulding companies. The object weighs about 1 oz. or a little over, could be moulded complete in one operation without metallic inserts, and would probably find its market through the chain stores. Beetleware plastic seems to offer a suitable material. The fundamental principle of the device is not novel, but this application is new to me.

Assuming, of course, that the idea has any value at all, I should like to offer it to one of the manufacturers for purchase outright. I am aware, however, that many of the moulding companies specialize to a large extent, and I should welcome information from yourself which might guide me in this matter. T.H.

[EDITOR'S NOTE.—Although few moulding concerns have sales departments organized to deal directly with the general public and in general make only to customers' orders, most of them are in close collaboration with distributing agents. We feel sure, therefore, that the majority of moulders would consider new ideas of sufficient promise. The inquirer should communicate with some of those moulding companies given in our directory pages.]

Heat-resisting Plastics

Darlington.

The Editor, *Plastics*.

Dear Sir,—On page 347 in your October issue of PLASTICS there is an inquiry for plastics in rod or strip form. In connection with some apparatus we are developing we require some short lengths of ¾-in. rod. It is subjected to a compressive stress, but well guided. It should be capable of satisfactorily withstanding a dry heat of at least 450 degrees F., and I shall be very grateful if you will let me know the best type of material for withstanding such temperatures.

CHIEF MECHANICAL ENGINEER, L.N.E.R.

[EDITOR'S NOTE.—The inquiry deals with an extremely difficult problem, for the temperature conditions are very high. Normally one can say that no organic material in the pure state will stand up to 450 degrees F., but by the introduction of asbestos fibres into the resin, or by impregnation of asbestos sheet with resin, the temperature resistance is increased greatly. Phenol-formaldehyde mouldings with asbestos as a filler are usually stated to withstand a temperature of 400 degrees F.-450 degrees F. Laminated material on an asbestos cloth base has been known to withstand a temperature of 500 degrees F. In this connection we have received a letter from Ellison Insulators which contains the following statement:—

"We manufacture 'Asp' Brand Tufnol, which is specified for a normal maximum working temperature of 400 degrees F., but we know one firm at least is using this material at a temperature of 500 degrees F., although we are not certain whether this is continuous or intermittent. We enclose a sample of this material in sheet form and we shall be pleased to supply sample lengths of rod if you consider that the Chief Mechanical Engineer of the L.N.E.R. would like to carry out tests."

A recent statement in the *Manchester Guardian* concerning asbestos compounds is interesting. "By employing suitable binding agents, such as cement, bitumen, or what may be grouped as synthetic resins, the asbestos fibres may be used as a filler to impart mechanical strength as well as arc-resistant properties . . . . it is interesting to note that the material is capable of withstanding a temperature of 350 degrees C. (662 degrees F.) under the most severe conditions without being affected in any way whatever."

With regard to this statement, the reader would probably obtain more details from Turner Asbestos Cement Co., Ltd., Trafford Park, Manchester.]

Beakers and Tumblers

Guildford, Surrey.

The Editor, *Plastics*.

Dear Sir,—Among the many firms in the plastic trade there are probably one or two who specialize in making small articles, such as beakers and tumblers. Would you kindly put us in touch with those firms who you consider would be most likely to be interested in the manufacture of such articles?—Yours faithfully,

COW AND GATE, LTD.

[EDITOR'S NOTE.—All of the moulding firms listed in our Directory of the Industry can, of course, make beakers and tumblers. Some of them, however, specialize in this branch of the industry and some possess what might be called stock moulds, which may prove suitable. The following have been listed as specialists in this range:—

British Industrial Plastics, Ltd.
H. E. Ashdown (Birmingham), Ltd.
The British Xylonite Co., Ltd.
Ebonestos, Ltd.
Birkbys, Ltd.
Lorival Mfg. Co., Ltd.

Standard Specifications

The British Standards Institution has just issued a revision of the specifications for Carbolic and Cresylic Acids as follows:—

515. Carbolic Acids 60's.
517. Cresylic Acids of High Orthocresol Content.
521. Cresylic Acid 50-55 per cent. Metacresol.
522. Orthocresol, Metacresol and Paracresol.
523. Phenol.
524. Refined Cresylic Acid.

These specifications lay down requirements as to the properties and purity of the materials, and specify limits for certain properties and impurities, such as specific gravity, crystallizing point, residue on evaporation or on distillation, neutral oils and pyridine bases, alkalinity or acidity, and certain other special tests depending on the material specified.

Standard methods of test for determining these properties are given in full detail as appendices. These methods have been based on the standard methods of test developed by the Standardisation of Tar Products Tests Committee.

Copies of these British Standards, Nos. 515, 517, 521, 522, 523 and 524, can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1. Price 2s. 2d. each (post free).

TRADE AND PERSONAL NOTES

British Rototherm Co., Ltd., have forwarded us a copy of their new brochure entitled "Modern Thermometry," which not only gives useful catalogue data, dimensions, specifications and prices of the various industrial and commercial Rototherm temperature gauges, but also sets forth the sound reasons, both mechanical, practical and economic, why the bimetallic temperature gauge is becoming each day more generally accepted by engineers as being most suited to modern requirements. Over 250,000 Rototherm temperature gauges are in use to-day, and the plastics industry, which realizes the importance of accurate temperature control, is now becoming a most valuable market.

"West's Gas," the well-known house journal published by West's Gas Improvement Co., Ltd., Miles Platting, Manchester, contains a number of most interesting articles dealing with coal-tar products. Mr. H. V. Potter, managing director of Bakelite, Ltd., has contributed a very fine article entitled "Modern Plastics."

Imperial Chemical Industries, Ltd., has just issued a new booklet entitled "Ethylene Glycol," which gives a valuable summary of the most important industrial applications of this chemical which is now available in bulk.

Lancashire Industrial Development Council has issued a report for the year to the end of June, 1938, which contains a great deal of information of interest and value to manufacturers in that area, or those who are thinking of starting new businesses in Lancashire.

E. I. Du Pont de Nemours and Co. Inc. have forwarded us the October issue of *The Du Pont Magazine*, which is full of interest for those engaged in industry. There is a particularly absorbing article on "The Steel Industry," which is an authoritative glimpse into its past, present and future, and is illustrated with a number of interesting photographs of the latest applications of steel.

The British Xylonite Co., Ltd., have sent us the September issue of their house journal, *The Xylonite Magazine*, which, as usual, is full of interest. Although primarily intended for the works staff, there is a good deal of information of considerable interest to the trade in general, especially as regards new developments at Hale End and Brantham.

Junior Institution of Engineers held a meeting on October 21, when Mr. G. S. Taylor read a paper on "Some Safety Provisions of the Factory Act."

Mouldrite, Ltd. (formerly Croydon Mouldrite, Ltd.), has changed its name to I.C.I. (Plastics), Ltd.

This step has been taken to bring the plastics group of I.C.I. into line with other manufacturing groups, such as I.C.I. (Metals), Ltd.

St. Helens Auckland Industrial Site was officially opened by Sir George Gillett, Commissioner for the Special Areas, on October 14, 1938. The area eventually to be developed is 46 acres and although mining districts are not usually associated with light industries, already three factories making leather handbags, buttons and plastic mouldings are hard at work. Ernest and Henry, Ltd., manufacturers of Erinoid and synthetic resin buttons, at present employ 50 persons, but the factory has a potential employment of 200. The Bond Moulding and Engraving Company, Ltd., specialize in engraving, die sinking and plastic moulding. The factory was occupied on September 1, 1938, and at present 50 persons are employed, the potential employment figure being 90. The site at Bishop Auckland is part of the Government scheme of aid to the Special Areas and its inception has been largely due to the efforts of the South-West Durham Improvement Association and Development Board. North-Eastern Trading Estates, Ltd., the company responsible for the Team Valley Trading Estate, manage the site on behalf of the Commissioner for the Special Areas.

The London Design Centre, 14, Marlborough Place, N.W.8, owes its origin to the directors of the London School of Interior Decoration. Its object is to produce designs, schemes, kitchen equipment, etc., as individual items; secondly to undertake the preparation of complete plans for interiors, and, through the staff of qualified architects attached to The Centre, of plans for buildings, housing schemes, etc.; thirdly, to evolve suitable forms and decorative treatments for articles of inorganic material, such as glass or plastics. The expert technical supervision of the studio ensures that all designs issued, however original, are eminently sound and workable. In cases where a new or difficult material is involved, the necessary collaboration is arranged with the manufacturer to enable the designer to learn the technical difficulties of his problem.

The Centre will in no circumstances undertake contracting work, but is willing to co-operate with contractors in the execution of designs supplied by it. No proposition is too small or too large for the organization to handle, and it should prove of service equally to the small "builder and decorator" who needs a scheme for some built-in shelves, to the manufacturer who seeks a new design for his mass-produced article, and to the contractor who plans a seaside housing estate.

Dr. E. Rhodes returned to England from Malaya in October to occupy the post as senior rubber technologist to the British Rubber Producers Research Association.

Ashdowns, Ltd., is now the correct name of the company formerly known as H. E. Ashdown (Birmingham), Ltd., Eccleston Works, St. Helens, Lancs. The change of name has been adopted for the sake of simplicity and involves no change in the activities of the company.

The Electric Lamp Manufacturers' Association of Great Britain, Ltd., organized a meeting of their Lighting Service Bureau on October 26, 1938, when Mr. T. O. Freeth gave a short talk on "New Lighting Ideas for Every Home."

The Micanite and Insulators Co., Ltd., Empire Works, Walthamstow, London, E.17, have forwarded us some interesting literature describing their synthetic resin bonded boards which find important applications in the electrical industry.

Institute of the Plastics Industry held their annual general meeting at the Science Museum, South Kensington, London, on October 25, when Sir James Swinbourne gave the presidential address on "Invention."

Illuminating Engineering Society, Decorative Lighting Section, held a meeting in the lecture theatre of the G.E.C., Magnet House, Kingsway, London, on October 25, 1938, to discuss "What is the Trend of Decorative Lighting?"

G. N. Higgs informs us of his change of address, which is 93, The Avenue, London, W.13. Telephone Number: Perivale 5404.

Thos. W. Ward, Ltd., announce a net trading profit of £241,698 for the year ended June 30, 1938. Total distribution 12½ per cent. less tax.

Cork Utilities, Ltd., is a private company, registered October 12, 1938, with a capital of £1,000 in 1,000 shares of £1 each, for the purpose of manufacturing or dealing in cork, metal, oil, synthetic resin, glue, electrical materials, etc.

W. R. Small is a private company just formed in Birmingham for the merchanting and manufacture of mica, micanite and various plastic materials. Nominal capital is £100,000.

NEW MATERIALS—NEW PLANT—NEW METHODS

Olefine Polysulphide Plastics

These are now receiving attention by plastic manufacturers and a recent British patent, No. 4,880,092 describes a method of manufacture by passing an olefine gas through molten sulphur. The invention covers a process for separating such plastics into definite fractions, which are more suitable, for certain applications, than the mixture from which they are obtained. The process consists of treating the mixture with a solvent, such as carbon disulphide, aniline, benzene, etc., and removing the undissolved part. The solution is then evaporated to give a flexible plastic mass. In the example given 100 grammes of an olefine polysulphide plastic made from the olefine vapour and molten sulphur are treated at room temperature with 400 grammes of carbon disulphide. An insoluble residue weighing 25 grammes separates out and is removed. Evaporation of the disulphide then gives almost 75 grammes of the improved plastic. The insoluble residue can also be utilized after suitable treatment.

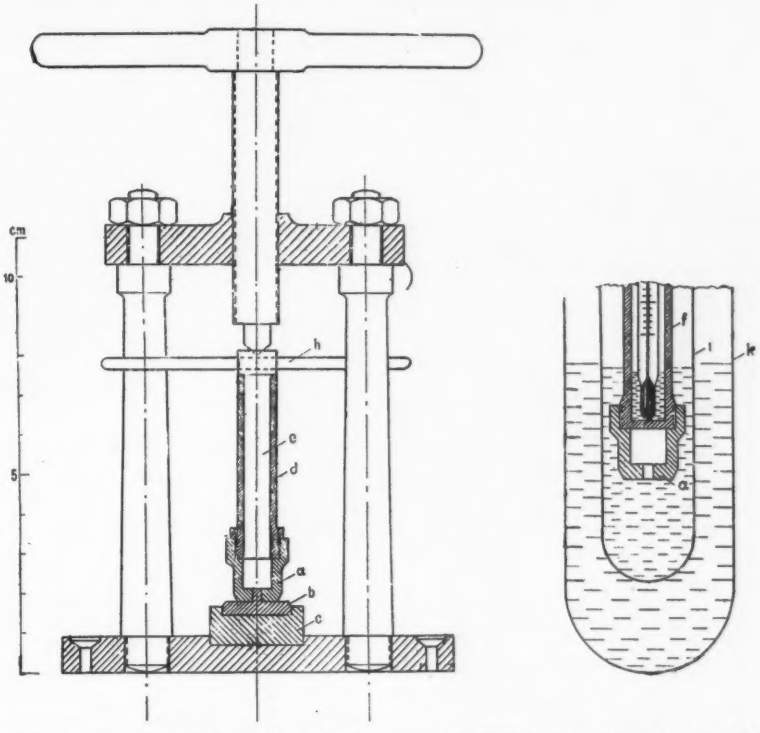
THE PLASTOSCOPE

A New Instrument for Testing Thermoplastic Substances

This instrument provides a test for thermoplastic substances, in that it determines the temperature at which the thermoplastic substance under test undergoes permanent deformation.

The substance to be tested is pressed as a pellet into a nipple *a* (Figs. 1 and 2), in the base of which is a standard (3 mm.) perforation. The nipple is closed at the top and heated in a suitable apparatus; when the characteristic temperature of permanent deformation is reached, extrusion of the substance as a cord from the hole in the base of the nipple is observed.

Fig. 1 indicates the method by which the substance is pelleted into the test nipple. The nipple *a* is screwed on to the press-cylinder *d*, the opening through the base of the nipple being closed by the die *b*, and the whole positioned on the base-block *c*. The substance to be tested, in uniform, finely divided condition, is filled in appropriate amount into the press-cylinder *d* by means of a funnel. Dust should, as far as possible, be kept off the wall of the cylinder, as this interferes with subsequent operations. The plunger *e* is now fitted into the cylinder, the whole fitted into the screw-press and the stop-rod *h* passed through the hole in the head of the



plunger to prevent rotation of the latter. The screw is then slowly turned to depress the plunger until the head of the latter just rests on the wall of the cylinder; the pellet of the substance under test now fills exactly the nipple *a*. The nipple is then unscrewed from the cylinder by means of a suitable key.

The filled nipple is now screwed on to the sealed plane-machined end of a brass tube, *f* (Fig. 2), containing glycerine as a thermal conductor, and a thermometer, as shown. The whole is then inserted into a glass tube *i* containing a liquid indifferent to the material under test, and this in turn is fitted into an outer glass tube *k* filled with glycerine. The whole apparatus is then heated slowly on a sand-bath until extrusion of the substance through the hole in the base of the nipple is observed.

The approximate temperature can be ascertained by a preliminary experiment; the final determination follows closely the procedure of a melting-point determination for an organic substance.

Typical results obtained with the Plastoscope are tabulated below; they include determinations on both moist and dry samples, from which the effect of moisture on thermoplasticity can be judged.

Sample No.	Moisture content. Per cent.	Temp. of deformation. Deg. Cent.
I ...	7.8 ...	123
I ...	Dried ...	222
II ...	6.0 ...	128
II ...	Dried ...	200
III ...	10.5 ...	109
III ...	Dried ...	146.5
IV ...	6.0 ...	122
IV ...	Dried ...	150

Kunstharze, Oct. 1938, p. 344, *from Der Papierfabrikant*, 1937, p. 365.

Self-winding Cables

We are informed by Power House Components, Ltd., of Nottingham, that their devices for the self-winding of cables are now finding a greatly extended use in many industries and a good deal of interest has been aroused in the plastics industry, where there is a growing use of small finishing tools such as the Hand-ee tool. Light, medium and heavy cables can be easily accommodated on the metal reels made by Power House Components, Ltd., and in the case of the light cable the reel is self-winding.

The advantages of employing some really efficient device for preventing cable from lying about the floor of the workshop are, of course, well known.

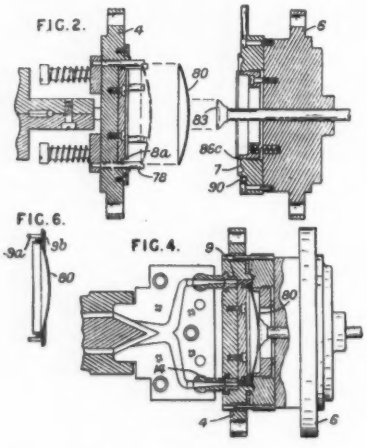
PATENTS RELATING TO PLASTICS

These abridgments of recently published specifications are specially compiled for this journal by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet, as issued, on payment of 5s. per group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address, price 1s. each.

488,064. Injection Moulding

ERIE RESISTOR CORPORATION. August 11, 1937, No. 22129. Convention date, September 17, 1936. [Class 87 (ii)]

Relates to a machine for die-casting plastic material such as cellulose acetate to form a bezel with a glass cover permanently set therein. The cover 80, Fig. 2, is placed on the rubber end 83 of a hand-operated rod passing centrally through a movable mould 6 having a resiliently mounted ring with a sharp edge 86*c* and a mould channel 7. The cover is moved into engagement with notched pins 78 slidable against spring pressure in a fixed



mould 4 having a complementary moulding channel with a sharp edge 8*a* for engaging the cover. The movable mould 6 is moved axially towards the mould 4, as shown in Fig. 4, and plastic material is forced through detachable nozzles 14 through sprue openings 9 into the moulding channel. The mould 6 is cooled by water circulated through an opening 90, Fig. 2, and the bezel and cover are removed together with the material in the sprue openings 9 which form projections 9*a*, Fig. 6, for securing the bezel 9*b* on a fixing support.

489,467. Mottled or Variegated Plastic Materials

CELLULOID CORPORATION. October 13, 1937, No. 27839. Convention date, October 13, 1936. [Classes 2 (ii) and 2 (iii)]

Moulded articles showing mottled or variegated effects are produced by moulding under the action of heat and pressure a mixture of two or more chemically different materials which are mouldable under heat and pressure and which have different degrees of plasticity under the moulding conditions employed, at least one of the plastic materials containing an effect material different from the effect material, if any, in the other or another of the plastic materials used. The effect material may be a dye or pigment, or a material which produces a difference of lustre, e.g., pearl essence.

489,764. Synthetic Resin Adhesives

HEINE, H. (trading as HEINE MOBELFABRIK PROPELLERWERK, H.). January 30, 1937.

Synthetic rubber such as "Buna" (Registered Trade Mark) rubber is glued to itself or to natural rubber or other supports, e.g., wood, by means of a solution of a hardening synthetic resin in an organic solvent such as alcohol or a mixture of alcohol and amyl acetate, to which a solution of boric anhydride or ortho, meta, or tetraboric acid and a chlorinated organic solvent such as carbon tetrachloride or ethylene dichloride, are added. The surfaces, coated with the mixture and allowed to dry, are pressed together, and allowed to harden.

489,575. Dyeing Casein; Buttons

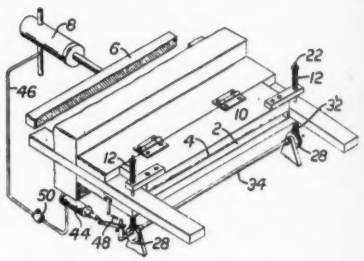
HILL, F., RADLEY, J. A., and IMPERIAL CHEMICAL INDUSTRIES, LTD. January 29, 1937.

Hardened casein, especially such as has been polished by treatment with a hypochlorite solution followed by drying, is dyed by treatment in a solution of a dyestuff of the monoazo or anthraquinone series carrying an alkylsulphuric ester group attached to an aromatic nucleus through O or N but free from sulphonic or carboxylic acid groups attached directly to an aromatic nucleus.

487,991. Extruding Plastic Materials

ARMSTRONG CORK CO. August 31, 1937, No. 23800. Convention date, September 2, 1936. Addition to 486,571. [Class 87 (ii)]

In extrusion apparatus of the kind claimed in the patent Specification, means is provided automatically to control the resistance presented to the material in its movement through the

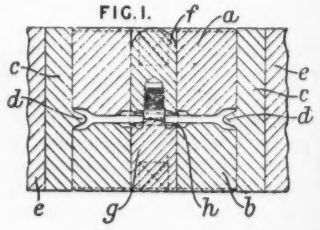


extrusion passage, so that the pressure applied to the material may remain uniform. As shown, the cylinder 8 for operating the plunger 6 is connected by a pipe 46 and check valve 50 with a cylinder 44 having a piston 48 linked to a shaft 34 carrying eccentrics 28 engaged by rods 22 that are urged downwardly by springs 32 against the action of the springs 12. When the pressure in the cylinder 8 rises above a predetermined amount, the shaft 32 is turned, whereby the rods 22 are raised, and the springs 12 apply less pressure to the hinged member 10 that engages the flexible wall 4 of the extrusion passage 2.

488,295. Moulding Pulleys, etc.

LORIVAL MANUFACTURING CO. (1921), LTD., and WHEWAY, J. February 8, 1937, No. 3742. [Class 87 (ii)]

A pulley or like rotary member such as a drum or roller is formed by moulding a thermoplastic or thermosetting material around a ball-bearing *h* and protecting the bearing from entry of



the material during moulding. The pulley is moulded between heated dies *a*, *b* having a central core-pin comprising members *f*, *g*, which are screwed together to clamp and enclose the ball race between them to prevent entry of material. The dies are retained within a split ring *c* held by a ring *e*. The ring *c* may be formed with a groove-shaping part *d*. The material may be a phenolic condensation product.

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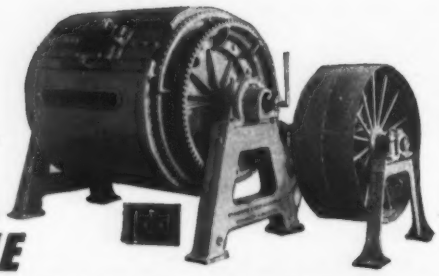

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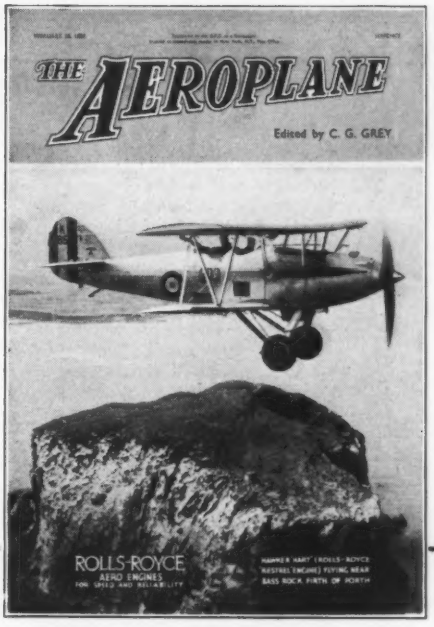

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